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Editorial Notes

Coal

THE Report by the Board of Trade on the working of schemes under Part 1 of the Coal Mines Act, 1930, has just been published, and it makes interesting and instructive reading. In one respect it differs from the reports which have been previously issued, for it shows considerable appreciation of the fears of the selling schemes which have been entertained by all classes of consumer. The report naturally endeavours to minimize the danger and emphasizes the precautions which have been incorporated in the new Coal Bill. The mere fact, however, that some appreciation of the consumer's point of view appears in the report is an indication that the work of the Conjoint Conference for suitable safeguards has had effect. Whatever protection has been incorporated in the new Bill is, perhaps, less important than the publicity which has been obtained. That publicity has had the effect of putting the public on its guard against any abuse of their powers by the Central Selling organizations, and there is to-day a strong body of Members of the House of Commons keenly alert to the dangers inherent in the monopoly possessed by the coal owners.

According to the report the prevailing factor during the period under review "has been one in which the level of prices was dictated more by market conditions than by the acts of the district sales committees," although "it is not suggested that the whole period passed without any difficulties under the schemes, even from the coal industry's point of view." The report freely admits that an examination of the attitude of consumers towards the operation of the scheme "discloses not only a large volume of complaint, particularly with regard to present increases in price, but also apprehension that, in the future, further increases will be demanded." "There was," the report declares, "also a fear on the part of consumers that even if those increases were unwarranted, they would have no redress." The report then urges the advantage of contact between buyer and seller "as a means of aiming at mutual understanding." It points out that in some districts this policy has been followed and refers in particular to the substantial measure of agreement on gas coal prices which has been reached in Durham and the Forest of Dean, "but in some districts, even after 18 months of organized selling, very little has been accomplished by way of frank and free discussion." The blame, we may add, cannot be laid at the door of the Gas Industry.

From these considerations the report turns naturally to a review of the work of the committees of investigation, but admits that this "gives no indication of the true extent of consumers' grievances, because there was undoubtedly a boycott of the committees on the part of a number of large consumers, particularly the public utility undertakings." It is pointed out, however, and perhaps this may be some justification of the boycott, if such there was, that in only one instance did a committee of investigation endorse the view of the complaining consumer that the prices charged were too high, and even in that case when the matter was referred to an arbitrator the finding was against the consumer.

The report then deals in full with the various representations which have been made to the Government by the Conjoint Conference of Public Utility Associations and summarizes the safeguards which have been obtained for the consumer as the result of those representations. The summary set out in the report is as follows: (1) Strengthening the powers and procedure of the committees of investigations and setting up an independent Central Appeal Tribunal; (2) assurances by the coal industry, the more important of which are now in course of incorporation in the selling schemes and are thus being given statutory effect; and (3) setting up a Departmental Committee, independent of the interests affected, to enquire into the methods of distribution of coal, coke, and manufactured fuel and the margin between the producers' price and the price to the consumer, and to make recommendations.

It has been necessary for the Gas Industry, as one of the largest consumers of coal in the country, to fight the coal-owners and the Government because it was felt that the right of the Industry to obtain its basic raw material at a reasonable and fair price was seriously threatened. The fight has been long, and at times fierce, but never with any weapons other than those which are clean and honourable. Much has been obtained, both within and without the new Coal Bill, but neither side has obtained complete victory. We welcome the new spirit shown by the report, to which we have referred in some detail; further, we believe this spirit will find a ready response on the part of the Gas Industry. Let the coal industry and the Gas Industry forget their differences and endeavour from now to arrive at mutual understanding and agreement, upon which alone the prosperity of both industries can be founded.

Gas or Electricity?

In the "Journal" for Aug. 11 last we referred in these columns to a Paper given by Mr. Herman Russell, at the time President of the American Gas Association. The Author is President of the Rochester (N.Y.) Gas and Electric Corporation, and the Paper, based on a thorough analysis and extensive survey of the domestic market, was concerned with the sales responsibilities and sales policy of a combination gas and electricity company; and as a result of that exhaustive analysis of a combined concern he arrived at the broad conclusion that where motive power is desired electric energy is generally preferable from the viewpoint of both consumer and company, and where heat is required gas is superior. In the study undertaken at Rochester the aim was first to determine what was in the domestic consumer's interests and, secondly, which service or combination of services brought in the greatest net revenue to the Company. Investigations were made to show the cost to the consumer and the return to the Company covering the cooker, water heater, and refrigerator for gas and electric service and various combinations of the two services. It was shown that gas service for cooking only is unprofitable—that to show an adequate return on the domestic business of a gas department of a combined company the cooking load must be retained and the water heating load promoted.

In Mr. Russell's Paper the space heating load was not considered, but it is obvious that in this field electricity cannot compete with gas. "Where," stated the Author, "the Rochester Company can readily deliver both gas and electric service in new territory it should not consider straight electric service for the reason that such service, to be profitable, must be considerably more expensive to the consumer and would require several times as much outlay of new capital by the Company. If electric rates for cooking and water heating were to be made competitive with present gas rates so as to bring the cost of complete electric service down comparable with the present cost of combined service, the return from all electric service would be more than wiped out."

We recall Mr. Russell's Paper in view of the contention expressed by Sir David Milne-Watson at the International Engineering Congress in Glasgow that the future of the Gas Industry in domestic supply lies in the rationalization of fuel service for heat by the concentration of the main cooking, space heating, and water heating loads under one set of distribution costs, and also in view of a Paper by Mr. A. M. Beebee at a recent conference of the Production and Chemical Committees of the American Gas Association. The Author is General Superintendent to the Rochester Corporation, and his Paper, a substantial extract from which is published in the "Journal" to-day, again shows clearly that for cooking, water heating, space heating, and refrigeration the consumer is best served by gas. Mr. Beebee remarked that all-electric cooking and water heating service to the customer is only profitable to the company at a cost to the customer twice the cost of equivalent gas service, and that at equal costs to the customer it is ruinous to the company. Rochester figures, explained Mr. Beebee, show an investment in supplying an electric range of $285, and that every electric range added to the lines means an annual cost of $43 and revenue of $39. Such business is obviously unprofitable to the company and it costs the consumer over twice as much as the equivalent gas service. The more widely known the true economics of gas and electricity supply are made, the better for all concerned.

A Wasteful Process

The Paper by Mr. Beebee touched upon many points of interest. He called attention to the vast reserves of coal in the United States and the diminishing reserves of oil and natural gas, expressing the view that coal is the source of energy of the future in America, that as time goes on the tendency of oil and natural gas to crowd out coal will reverse itself, that it is almost suicidal folly to develop hydro-electric power, which is the world's worst employer of labour, in a country which has adequate coal reserves. In his lecture to the Royal Society of Arts last March Mr. E. V. Evans pointed out that electricity is a means of transmitting mechanical power. In converting heat energy to mechanical energy it is necessary to sacrifice something between two-thirds and three-quarters of the heat energy of the coal. Surely, he suggested, the very last purpose to which such energy should be put would be re-conversion to the low grade heat energy from which at such cost in fuel and money it was obtained. This unreasonable and uneconomic re-conversion of mechanical energy was commented on by Mr. Beebee, who emphasized that where heat is required some two to three times the amount of useful energy can be made available to a customer in the form of gas from a given amount of coal as can be made available in the form of electricity. He emphasized, too, that the average energy requirement of the American home in the form of gas is about ten times that in the form of electricity, yet the cost of the gas is not much greater than that of the electricity.

Economics of Gas Making

In regard to the economics of gas making, Mr. Beebee, having discounted the idea of producing gas at the pithead and piping it to the point of consumption, remarked that, though we have heard a great deal about complete gasification, gasification in oxygen, liquified gases, and so on, there appears no Aladdin's lamp on the horizon to make gas cheaper than coal. However, the efficiency of control with gas, its cleanliness, labour saving, and ease of application will enable it to compete with coal for most refined uses. He went on to point out that, as things are at present, the only way to cheapen the therm is to upgrade coal not only into gas but into other revenue producing products. As we have said many times, while we all look to the all-gas era and while we support investigations towards this desirable end, the fact has to be faced that without the sale of coke there would be a decrease in the sale of gas. If the Gas Industry was able, without the aid of coke, to produce gas at such a price that it could oust raw coal, no one would suggest that the Industry should make coke; and Mr. Beebee shares our view that there is considerable development possible in the coal carbonizing process still further to lower present costs.

The water heating and space heating fields in America obviously offer enormous possibilities for the extended use of gas, which must increasingly play its part in the modern home. Why then, asked Mr. Beebee, are there the depressing data on decreases in the output of the manufactured Gas Industry? One reason is that comparison is made with former years in which manufactured gas undertakings were in operation but which since then have been converted to natural gas, thereby distorting the figures which purport to be a true index of the state of the manufactured Gas Industry and its service to the consumer. He went on to say that

figures based on sales per consumer should theoretically correct for this error, but here again factors arise to create false impressions. As an example, many manufactured gas undertakings have changed to higher calorific values, some to values as high as 800 B.Th.U. per cu.ft., and sales comparison on the 1,000 cu.ft. basis must be unfavourable. As for comparisons between the Gas Industry and the electricity industry based on percentages, the former is delivering ten times as much energy as the electricity industry is doing to the domestic consumer, and to show a 10% increase the Gas Industry must add as much load as would be equivalent to a 100% increase in the electric load. The Author then analyzed the data relating to the sales of manufactured gas in the past four years. The yearly decreases have been slight and in the last two years the decreases have been diminishing. In 1937, with the exception of two months, domestic gas sales for the last nine months showed a steady, though slight, increase. Mr. Beebee suggested that this may well be regarded as an indication of the turning point.

One would have expected in any Paper dealing with trends in the Gas Industry attention directed to the imperative need for the adoption of promotional tariffs to effect any substantial increase in gas sales. Though this point is not emphasized by Mr. Beebee, we know that the Rochester Corporation is an enthusiastic and successful tariff promoter. "The future demands," said Mr. Herman Russell in the Paper to which we referred at the commencement of these notes, "greater general sales effort, including the provision of attractive tariffs for gas sold, to bring about a better understanding on the part of the public of the many advantages in the way of economy and performance which gas has to offer." This policy we have long advocated while at the same time not minimizing the efforts or losing sight of the importance of the work of those engaged in the production of gas, in passing on to the salesman a cheap therm which will give complete satisfaction to the consumer.

Gas Consolidation

EVIDENCE of the advantages of co-ordination and group working was forthcoming in the speech of Major Julian Day at the annual meeting last week of Gas Consolidation, Ltd., when he was able to report a successful year's working. He emphasized that efficiency, not mere size, is the object of the Corporation, that its development is sound and steady rather than spectacular. During the year additional investments to the value of £109,659 were acquired, largely represented by controlling interests in the Stone Gas Light and Coke Company, Ltd., and the Uttoxeter Gas-Works, Ltd.—undertakings supplying gas in adjoining areas in Staffordshire. The Corporation now controls seven gas companies operating in that county, and at the moment is in negotiation with several local authorities for the acquisition of their gas undertakings. Major Day spoke of the benefits accruing from association with the Severn Valley Gas Corporation. The two holding companies co-operate fully in the provision of a service organization for the operating companies; and it has been possible to share the expenses and make full joint use of research and specialized services.

Among the matters touched upon by Major Day in his speech, we would refer here to three. First, his explanation of the steps which have been and are being taken to ensure a thoroughly satisfactory coke supply. Coke handling plant is being modernized, and already the Corporation is obtaining the advantage of being able in several of its constituent undertakings to supply coke properly graded for particular uses. Then his remarks on the establishment of new showrooms and their effect on the sale of appliances. During the past year the subsidiary companies have sold appliances to the value of £84,335, which, taking into account the total gas sales of these companies, 1,329 million cu.ft., is highly satisfactory. Mobile showrooms have been provided for use in scattered districts and are operating with excellent results. The third point to which we would call attention is Major Day's reference to the adoption of promotional tariffs for gas. Either block rates or two-part tariffs, or both, are gradually being introduced by the constituent undertakings; and Major Day remarked that the figures so far available showed that their introduction had been satisfactory from the point of view of both sales and revenue. With promotional tariffs the prospects of gas in home and industry are entirely changed, and there was every justification for the spirit of optimism and confidence in which Major Day concluded his speech, which is reported in this issue of the "JOURNAL."

The Gas Crematorium

Much interest will be attaching to the article which appears on later pages of this issue relative to the up-to-date gas crematorium lately completed at the Putney Vale Cemetery. It is early days yet accurately to assess the value of this comparatively new application of gas; but there can be no doubt that there exists for the Industry in the increasing adoption of cremation which is noticeable to-day a potential demand that may well involve a very useful load. The ability of gas furnaces to meet this demand in a thoroughly proper, economical, and efficient manner will be apparent from our description of the very fine plant which has been installed at Putney Vale, while the complete absence of smoke and smuts—so important in relation to environment—together with all-round cleanliness and accuracy of control, render gas furnaces pre-eminently suitable for such a purpose. Appreciating the susceptibilities of those who, while approving of cremation in principle, still, perhaps, feel anxious about the specific methods employed, we would draw especial attention to this design of plant. Radiant heat only is adopted, and the consequent absence of gas flames within the furnace ensures that cremation is effected by self-combustion alone. The speed of the operation is another point in favour of gas, only 40 to 50 minutes being required per cremation once the furnace is initially heated up. The surface combustion method of warming the chapels will also prove of interest as a suitable means of providing intermittent warmth of a kind which becomes fully effective in a minimum time. There is no need to observe here that the space available for cemeteries cannot be extended indefinitely, and the problem of finding sufficient ground, particularly in the more populous urban areas, is in many cases becoming acute. This, coupled with the growing trend towards cremation, leaves no room for doubt that local authorities will be considering the provision of crematoria in their areas in ever-increasing measure in the not distant future. It will therefore be of benefit to gas undertakings generally to acquaint themselves with the type of plant available, so that they may be first to submit suitable schemes when the matter comes up for discussion.

New W-D Plant at Rochdale

Described on later pages is a new installation of Woodall-Duckham upwardly heated continuous vertical retorts officially inaugurated at Rochdale last week by Councillor A. Ashworth, Chairman of the Gas Committee. An interesting feature of the installation is that it was constructed in two stages, for there was insufficient gas-making plant to carry the load satisfactorily had an attempt been made to complete the work in one stage. Despite the risks attending such a method of building, the work was carried through with complete success. The installation comprises 24 retorts fired by a separate battery of four breeze burning

producers, and it replaces an installation of four settings, each of four retorts, of downwardly heated verticals. The new plant is capable of producing 3,060,000 cu.ft. of 475 B.Th.U. a day, compared with a capacity of the old bench of 2,016,000 cu.ft. a day. The Rochdale Gas Department has equipped itself to meet at any rate in some measure the increased manufacturing charges due to dearer materials—this applies especially, of course, to coal—and to higher labour costs. And in this connexion not the least important feature of the reconstruction programme is the provision of new coke screening plant.

Personal

Mr. F. A. HOOPER, Commercial Manager of Messrs. John Wright and Co., Ltd. (Radiation Ltd.), has been appointed a Director of that Company.

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At the last meeting of the Council of the Institute of Fuel it was decided to award the Melchett Medal for the current year to Professor RICHARD VERNON WHEELER, D.Sc., F.G.S., F.I.C. Professor Wheeler will give the Melchett Lecture to the members of the Institute at 3.30 p.m. on Thursday, Oct. 13, in the Meeting Room of the Institution of Mechanical Engineers, Storey's Gate, London, S.W. 1. Non-members who desire to be present at this meeting will be cordially welcome.

Professor Wheeler has been well-known for many years as the Professor of Fuel Technology in the University of Sheffield; also as the Director of the Safety in Mines Research Board Experimental Stations in Sheffield and Buxton. Born in 1883, he was educated at Plymouth College, and Owens College, Manchester. He is a Dalton Scholar and Fellow of the University of Manchester. He is the Author or joint Author of 189 publications dealing with the constitution of coal, blast furnace coke, coal mining problems, scientific and technical Papers on coal combustion and flame, besides being joint Editor of *Fuel in Science and Practice*. Professor Wheeler has acted for many years as science adviser to British Government departments as well as many industrial organizations.

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Mr. ALEXANDER TRAN, Assistant Engineer and Manager, Bath Gas Company, has been appointed to the position of Assistant Engineer and Manager to the Reading Gas Company in succession to the late Mr. L. A. Rumble. Mr. Tran has previously held similar appointments with the Coatbridge Gas Company and the Helensburgh Corporation Gas Department.

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Motherwell and Wishaw Town Council on July 5 appointed Mr. WILLIAM KIRK as Engineer and Manager to the Burgh Gas Department in succession to Mr. ALEXANDER M'DONALD, B.Sc., who has been appointed General Manager of a group of Yorkshire Gas Undertakings controlled by the United Kingdom Gas Corporation. Mr. Kirk served his apprenticeship at Falkirk, being appointed Assistant Gas Manager at the Polmont Gas-Works in 1929. In March, 1934, he went to Motherwell as Technical Assistant, being appointed in August of the same year as Deputy Engineer and Manager to Mr. A. M'Donald, B.Sc., whom he now succeeds.

Well known in Scottish gas circles, Mr. Kirk in 1928 was elected to the Council of the Scottish Juniors (Western District) becoming Hon. Secretary and Treasurer of the Association six years later. He was elected to the Committee of the Scottish Gas Salesmen's Circle in 1936, winning the Silver Medal awarded by the Circle for a Paper read in December of last year.

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Mr. G. H. Powell, representing the old Directorate and employees of the Monmouth Gas and Waterworks Company, Ltd., recently acquired by the Severn Valley Gas Corporation, this week made a presentation to Mr. H. MATTERFACE, who, as already announced, retired from the position of Engineer, Manager, and Secretary on June 30. He had held the post since Jan. 1, 1919. Mr. Powell said how much the Company appreciated all the work that Mr. Matterface had put into the Undertaking and how it had been placed on a sure footing during his term of office. The presentation, which took the form of a chiming clock suitably inscribed, was made by Mr. S. Hickson, who had worked under Mr. Matterface for the past nineteen years. Mr. Matterface, expressing his thanks, said that they had all worked together in good and bad times and he hoped the same spirit would be accorded Mr. A. E. Pask, who had succeeded him. Mr. Pask, who was present, said he felt sure that with such a band of helpers he had no fear for the future.

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At a recent meeting of Peterhead Town Council, Mr. ERNEST V. CHALMERS, Engineer and Manager of the Dunblane Gas Company, was appointed Engineer, Manager, and Secretary of the Peterhead Gas Department in succession to Mr. WILLIAM RITCHIE, who has retired. Mr. Chalmers had been at Dunblane for thirteen years.

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Mr. LAWRENCE E. DOUGALL, who for some years has represented Dougall's Gas Meters, Ltd., has been elected to the Board of that Company.

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Mr. B. W. DAWKINS, of Beckton, has succeeded Mr. F. H. G. Higton as Secretary of the London and Southern District Junior Gas Association.

Obituary

The death occurred on Friday, July 1, of Mr. THOMAS HENRY BROOMHEAD, Engineer and Manager of Bollington Gas Department. He was sixty years of age and passed away at his home, 44, Henshall Road. Since his appointment in 1920 the Works had been almost completely rebuilt. Among the more recent improvements were the erection of the vertical retort carbonizing plant and the new gasholder. He began his working life at the Macclesfield Gas-Works and prior to going to Bollington he held appointments at Nuneaton, South Shields, Dublin, Wilmslow, and Newcastle. Mr. Broomhead leaves two sons, Mr. Harry Broomhead, Manager of the Desborough Gas Company, and Mr. Jack Broomhead, Technical Assistant at the Bollington Works, who acted as Manager during his father's illness.

Order or Chaos in the Coke Market

The three articles which appeared under this title in our issues of June 1, 8, and 15 are now available in reprint form. It will be remembered that the articles were the result of an independent investigation into the present and prospective coke market situation, in which the interests of producers, distributors, and consumers were all given due weight.

In view of negotiations which are proceeding in various quarters at the present time, there is a demand for the concise summary of the situation which these articles contained, and copies of the reprint can be obtained from the publishers of the "JOURNAL," Walter King, Ltd., 11, Bolt Court, Fleet Street, E.C. 4. Single copies 3d. each, and 2s. 6d. a dozen post free. Quantities of 100 at 18s., carriage extra.

Forthcoming Engagements

July

15.—I.G.E.—Ad Hoc Joint Committee on Research with S.B.G.I., Gas Industry House, 2.30 p.m.

19.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.

19.—S.B.G.I.—Council Meeting, 56, Victoria Street, 2.30 p.m.

20.—I.G.E.—Meeting of Pipes Committee, 2.30 p.m.

21.—I.G.E.—Meeting of Gas-Works Safety Rules Committee, 2.30 p.m.

22.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m. (*Transferred from June* 24.)

August.

9, 10, and 11.—Irish Association of Gas Managers.—Annual Meeting in Dublin.

September

8.—North British Association.—Annual Meeting at Largs.

October.

1-4.—B.C.G.A.—Annual General Meeting and Conference at Brighton (for Programme see p. 34 of "JOURNAL" for July 6).

News of the Week

First Prize for trade vehicles in the Heanor Carnival procession held on July 6 was obtained by the Derby Gas Light and Coke Company.

Benzole Recovery, it is expected, will begin at the Dover Gas-Works by the end of this year. Orders have already been placed for the necessary plant.

Work Has Now Commenced in connexion with the scheme for supplying gas from Brigg to Broughton, and it is anticipated that all the mains will be laid in about two months' time.

The Efficiency of Gas Lighting compared with electricity was discussed at a recent meeting of the Consett Urban Council. The Works Committee's recommendation that the Council should enter into an agreement with the Shotley Bridge and Consett Gas Company to retain gas lighting for ten years was adopted.

New Coke Plant has been installed at the Dover Gas-Works in place of a hand-fed plant and cutter. Its capacity is 210 tons of coke and 50 tons of breeze. A shuttle conveyor for storing coke and a reclaiming conveyor for lifting coke on to the belt to the hoppers have also been added to the works plant.

For Industrial Purposes, Messrs. Colville's, Ltd., who are opening up Mossend Steel Works, formerly owned by William Beardmore & Co., Ltd., have intimated to Lanark County Council that they will require between 70,000 and 80,000 cu.ft. of gas per week. A Sub-Committee has been appointed to interview Messrs. Colville's regarding the terms of supply.

At a Special Meeting of the Leicester Gas Committee it was suggested that a portion of the £16,000 surplus from the Gas Undertaking on the year's working should be devoted to the relief of the rates, but after some discussion it was decided that the whole amount should go to the reserve and renewals fund. It was pointed out that the surplus was the result of very careful management and with increasing costs there were difficult times ahead.

Opposition to the Stockton Special Order has been withdrawn by the Darlington Town Council, who have decided to omit the parish of Bishopton from the Darlington Order. The Darlington Council propose to supply gas to Gainford under the Special Order and to erect a gasholder on land south of Coniscliffe Road. The Works Committee, however, has informed the Gas and Electricity Committee that they will not consent to the building on their land of an upright gasholder of the design suggested, but that if an alternative site is not available, they will be prepared to consider designs of a horizontal gasholder of a height not exceeding 25 ft.

On the Kind Invitation of Ascot Gas Water Heaters, Ltd., some 160 members of the Edinburgh, Leith, and District Master Plumbers' Association visited the Empire Exhibition, Glasgow, on July 7. The visitors were entertained at lunch in the Concert Hall Restaurant, Mr. E. Rosslyn Mitchell, Chairman of the Ascot Company, presiding. Expresisng his pleasure at welcoming the company, Mr. Rosslyn Mitchell said that while they sat at lunch some 67 more "Ascot" gas water heaters had been added to the number in existence. He proposed the toast of "The Edinburgh, Leith, and District Master Plumbers' Association," coupled with the name of the President, Mr. Robert R. Little. Mr. Little, replying, thanked the Ascot Company for their hospitality and presented a silver cigarette case, suitably inscribed, to Mr. C. W. Busby, Scottish Branch Manager of the firm. Acknowledging the gift, Mr. Busby said that at the works the output of gas water heaters was 1½ per minute for an eight hours day. He hoped, with the co-operation of the friends with them that day, to see it soon increased to 2½ per minute. Mr. George Munro, Manager of Edinburgh Corporation Gas Department Showrooms, said that in 1919 it had been suggested that Edinburgh Corporation should sell its gas-works to a private company. Fortunately, wisdom overcame prejudice, and since then Edinburgh had increased its output from 1,600 million cu.ft. to 4,000 million cu.ft. annually, an increase of 180%. The company thereafter inspected the various gas exhibits and were entertained later to tea by the Ascot Company.

A Bulk Supply of Coke Oven Gas is being considered by the Oswaldtwistle Urban Council, who have referred to the Gas Committee for consideration the advantages or disadvantages of buying coke oven gas as compared with the present method of coal gas manufacture.

A Sub-Committee to Visit and Inspect Showrooms and offices belonging to other gas undertakings and to report has been appointed by the Southport Gas Committee. It is proposed to apply to the Ministry of Health for sanction to borrow the sum of £20,000 for the purchase of cookers, fires, and other appliances.

In Compliance with the Provisions of the Heathfield and Waldron Gas (Charges) Order, 1921, notice is given that on and after Oct. 1 next the calorific value of the gas which the Heathfield Gas Company intend to supply will be 495 B.Th.U. per cu.ft. The Undertaking is controlled by the Eastbourne Gas Company.

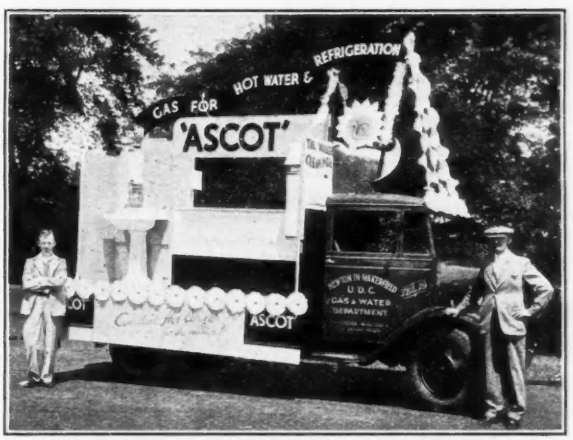
High Prices were received at a sale by auction on July 1 of 315 ordinary shares in the Dawlish Gas Company. Prior to the past two or three years, in which 8% has been returned, the shares paid 10%. They were sold in five blocks of fifty and one of sixty-five, and realized 41s. 6d., 42s., 42s. 6d., 43s., 42s. 6d., and 44s. per share, respectively.

A Reduction in Calorific Value from the present declared value of 560 B.Th.U. per cu.ft. to 545 B.Th.U. is intended to be made by the South Suburban Gas Company on and after Nov. 1 next, according to an announcement in the *London Gazette*. This will not apply to the areas formerly supplied with gas by the Sevenoaks and Tonbridge Gas Companies respectively.

Application for a Special Order is to be made to the Board of Trade by the Whiteaven United Gas Company for the purpose of defining the limits of supply and of capital and borrowing powers, to establish a renewal fund and leasehold redemption fund for writing off depreciation, to provide for the charging of gas on a thermal basis, and for other usual purposes.

Of 2,564 Gas Meters submitted for official test by the Blackburn Gas Department, states Mr. H. J. Collings, Inspector of Gas Meters, Blackburn Corporation, in his annual report, 2,518 proved correct and 46 incorrect, the percentage of rejected meters being 1·78 as compared with 1·97 for the previous year. The number submitted was an increase on 1937 of 177. The number of prepayment meters was 1,827 or 71·26% of the total. Of 22 meters the registration of which was in dispute, ten proved to be correct and twelve incorrect.

An "Ascot" Carnival Display



This display was entered by the Newton-in-Makerfield Urban District Gas Department in the recent Earlestown Hospital Carnival, and attracted much public attention.

Hot Water Supply for Schools

Gas Storage Heaters Provide the Solution

In a publication, issued by the Board of Education, for the guidance of local Authorities the following recommendation appears:

> "Wherever possible hot water, with control taps to prevent scalding in the case of young children, shall be provided. . . . A plentiful supply of hot water throughout the school year with adequate supply of soap and towels is one of the most effective aids in the social instruction given in schools."

Many Educational Authorities are endeavouring, over a period of a few years, to comply with this recommendation. In the case of new schools the matter is simplified from the outset, and arrangements can be made in the plans for central heating and for hot water supply from a calorifier fed from a boiler of correct capacity and suitable for use all the year round.

Existing schools, however, in many cases present a special problem. Wash-basins are often situated at various parts of the school quite remote from each other, making the installation of a central hot water system quite impracticable, and separate heating units become necessary at each set of wash-basins. In such cases gas has been found the ideal method. Special consideration, however, must be given to several important points. Automatic temperature control is essential, and such control must not be affected adversely by varying rates of water flow such as will happen when varying numbers of taps are in use. The incidence of the demand also varies widely; at times small supplies only are needed two or three times an hour, while at other times a full flow from six taps simultaneously is necessary. Storage heaters capable of rapid recovery have proved to be an excellent solution.

Such an installation is working with complete satisfaction in a large London Council School where "Equator" multi-point storage heaters manufactured by Richmonds Gas Stove Company, Ltd. (Radiation Ltd.), have been supplied and fitted by the Lea Bridge District Gas Company to provide hot water for approximately 600 children in the infant and junior departments. There are four washing lobbies and each is equipped with a separate 18-gallon "Equator." Water is stored at 140° F., but prior to being drawn off at the taps is mixed with cold water at a junction on the supply to the hand basins and is delivered at 85° to 90° F. The temperature is set by control taps on the hot and cold supplies. These taps, once set, remain locked, and a non-return valve is fitted in the cold supply to prevent infiltration of hot water. In addition to the mixed water draw-off spray taps over each set of wash-basins, a hot water supply is also led to a draw-off tap fitted with lock shield device for the use of the school cleaners.

In addition to the foregoing, five single-point Richmonds "Newlyn" storage heaters have also been fitted—*i.e.*, one in the handicraft room; one in the medical room; one in the male teachers' lobby; one in the lady teachers' lobby; and one in the headmistress's room.

The success of this Richmonds installation will be of interest to all gas salesmen and especially those whose work brings them into contact with officials responsible for school equipment. The need for hot water is there, and the above brief description shows how efficiently "Equator" and "Newlyn" storage heaters can supply the need to the entire satisfaction of all concerned.

Amalgamation and Grouping

North Cheshire Gas Company.

The North Cheshire Gas Company, a Subsidiary Company of the United Kingdom Gas Corporation, Ltd., took control as from July 2 of the Dukinfield Corporation Gas-Works which have been purchased by the United Kingdom Corporation for £80,530. The whole of the staff at Charles Street has been retained, and the Company have also engaged the services of two of the staff of the Borough Treasurer's Department.

Bath and Calne.

Among the objects of a Special Order for which the Bath Gas Company intends applying to the Board of Trade, under the Gas Undertakings Acts, 1920 to 1934, is to empower the Company to take over the Undertaking of the Calne Corporation and to extend their limits of supply so as to include the area of the Calne Undertaking and certain other added areas.

Bronze Medal for Inventions

Mr. H. J. Toogood's Success in Paris

Where invention concerns the trend of carbonization, Mr. H. J. Toogood needs no introduction to our readers. As recently as March 16 we illustrated his new invention relative to grates for coke producers, which he described to a meeting of the Western Juniors. It is news, however, to learn that in a World Competition for Inventions at a recent Paris Exhibition he was successful in gaining an award of a bronze medal for an invention in an entirely new direction. Mr. Toogood submitted two patented inventions. In one model, which won him the medal, he turned his thoughts to the dog world and constructed a distinct new type of kennel which is claimed to benefit the dog physically and intellectually, and to increase its range of freedom.

His other invention related to what is claimed to be a fuel-economizing, space-saving, mantelpiece for flats, designed to deflect the radiant warmth of a gas fire into the room to the added comfort, convenience, and economy of users.

Birmingham is Proud of Its Gas Undertaking

Official Inspection by Council Members

Following an official inspection of the Windsor Street Gas-Works of the Birmingham Corporation by members of the City Council on July 6, the Lord Mayor, Councillor E. R. Canning, voicing the thanks of the visitors for a very interesting afternoon, said the Council were eminently satisfied with the efficiency of their Gas Undertaking. He congratulated the Gas Committee on the working of the largest of the Council's departments. Councillor A. S. Giles, thanking the Lord Mayor, said it was true that the Gas Department was the largest of the Council's undertakings, and it was also the largest municipally-controlled gas undertaking in this country. The Windsor Street Works were constructed in 1838, so that the present year marked their centenary. The installation of vertical retorts now in use occupied about one-third of the area occupied by the original horizontal retorts; the quantity of gas produced, however, had increased threefold. In anticipation of still further growth the Department had purchased land at Forge Mills, near Birmingham, where in time a further works would be erected.

New Showrooms at Conway

The Conway Gas Company, Ltd., who purchased the Gas Undertaking of the Conway Borough Council in October, 1936, have just completed the reconstruction of the old municipal offices which have been opened as gas showrooms and offices. The Company have leased the buildings in Castle Street from the Corporation for a period of twenty-one years. The original façade has been altered as little as possible. Inside, the showroom has been decorated in green and chrome textured plastic paint, with satin black skirtings.

Cookery demonstrations are now being given by Mrs. Dorothy Scott, N.T.S.C., of the Parkinson Stove Company, Ltd., during the morning and afternoon of each day except Saturdays.

Gas Lighting to Continue at Hadfield

Hadleigh streets, which for the past fifty years have been lit by gas, will be so lit for at least another five years. This was stated at the monthly meeting of the Hadleigh Urban District Council held in the Town Hall Committee Room on July 4.

Estimates had been received from the Hadleigh Gas Consumers' Company, and the East Anglian Electric Light Company, Ltd., and that of the former for five years was accepted. The Company will be asked for further estimates for lighting during the months of May, June, July, and August.

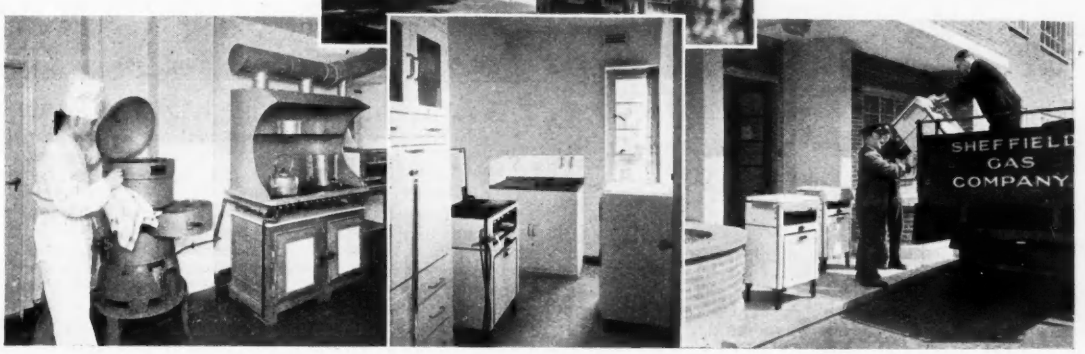
Good Work for the Industry at Glasgow

At the Empire Exhibition Mr. John McIsaac, Industrial Sales Superintendent of the Glasgow Corporation Gas Department, has earned the gratitude of the Gas Industry by the able manner in which he organized the exhibits on the Industrial Stand before the opening of the Exhibition, and for his efficiency in control since that time. Our photograph shows him happily posed, almost one might say, beside the monster he created.

Mr. John McIsaac.

Mr. McIsaac joined the Gas Department in 1902 as a fitter, was appointed District Inspector in 1912, Industrial Heating Inspector in 1913, and Industrial and Sales Superintendent in 1921. He therefore has very considerable experience in the use and application of gas for industrial purposes. During the War he supervised the installation of all the industrial heating plant for Glasgow's very extensive munitions programme. This unique experience and his training in the theory and practice of heat treatment of metals and furnace combustion make Mr. McIsaac ideally suited for the important position he now holds in the Industry.

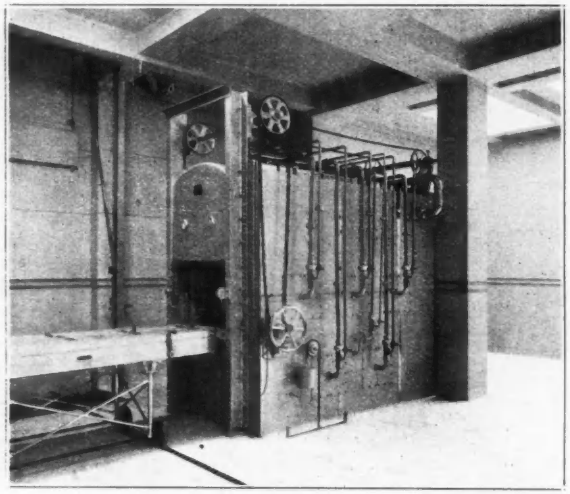
Modern Cookers for New Sheffield Flats



The accompanying photographs are of a new block of 35 luxury flats in Sheffield. Each kitchen is equipped with a "Renown" gas cooker, while convenient gas points are provided in the sitting-rooms. As will be seen from the lower left-hand illustration, the service kitchen is also equipped with modern gas appliances.

Gas Leads the Way in the Modern Crematorium

A description of an interesting installation of gas crematorium furnaces and radiant heating units recently completed at the Putney Vale Cemetery, Wandsworth.



One of the Cremation Furnaces, showing in front of it the trolley on which the coffins descend through the shaft in the top left-hand corner of the photograph.

There is at the present time a definite trend towards a greater use of cremation, and local authorities all over the country are considering the installation of suitable plant as a necessary adjunct to their cemeteries.

It is not within the scope of this article to discuss the broader or national aspects of cremation; but, with due deference to those who still adhere to the form of burial hitherto generally adopted, it must be clear to everyone that the space available for cemeteries cannot be expanded indefinitely, and the problem of finding sufficient ground for this purpose, particularly within the more populous urban areas, is in many cases becoming acute. With this in mind, therefore, together with the veering of public opinion on the subject, there is little doubt that crematoria will be made available in increasing numbers in the future.

In this trend towards cremation, then, there exists for the Gas Industry an opportunity for increasing still further our service to the community. Properly designed gas furnaces offer unique advantages for cremation on the score of both efficiency and cleanliness; and from the latter point of view it is needless to stress the importance of complete absence of smoke and smuts in such situations as those in which crematoria will normally be found. Moreover, in spite of the strange ideas which have prompted certain authorities to install other types of furnace for this work, it has been proved beyond all question that gas is the most economical and practical method when so large a heat output is demanded in so comparatively short a period.

The recent extensions at the Putney Vale Cemetery by the Wandsworth Borough Council provide a fine example of a gas crematorium, every detail of the construction of which goes to show how admirably gas fulfils the requirements, not only of the furnaces themselves, but additionally for the heating of the chapels and waiting room. Everything is in perfect keeping with the atmosphere which it is desired to promote, while the light and roomy furnace-room in the basement, with its Terazzo floor and walls and spotless equipment, is the last word in cleanliness.

The Building.

Before dealing with the technical details of the furnaces and their ancillary equipment, it may be of interest to refer briefly to the lay-out of the building and the general procedure appertaining to cremations.

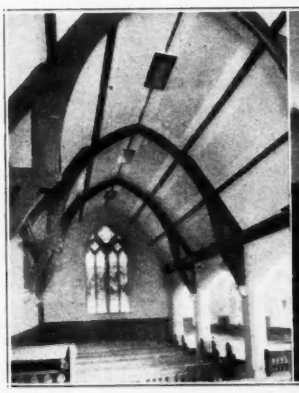
The building consists of two chapels—one for Church of England and the other for Nonconformist burial services—between which is a small waiting-room, while behind is a lobby containing rows of compartments to hold the urns which are used for cremations. A view of one of the chapels and of the waiting room is shown in the accompanying illustrations. At the end of each chapel is a bronze catafalque, fitted with rubber rollers, on which the coffin is placed. At the appropriate moment the minister conducting the service presses a button which gives a visual and audible indication in the furnace-room below. The attendant then operates a handle which opens the sliding doors in the wall behind the catafalque, and the coffin slowly passes out of sight on to a trolley behind. The doors close again, and the trolley bearing the coffin sinks down on to a recessed run-way which goes from end to end of the furnace-room in front of the furnaces. Thus a coffin from either chapel can be consumed in any furnace, as the two lift-shafts descend at either end of the run-way. The trolley is then pushed in front of whichever plant is being used for the cremation and the coffin delivered into the furnace. Save for moving it directly into the furnace, the coffin is not touched by hand from the moment it is placed by the bearers on the catafalque, the whole procedure being quiet and dignified from start to finish.

The Furnaces.

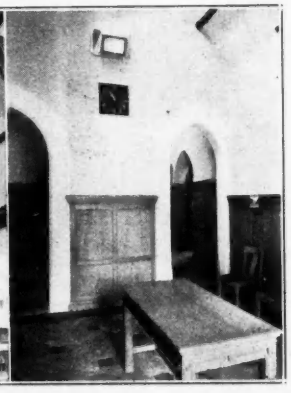
The furnaces and heating installations at Putney Vale were entrusted to Radiant Heating, Ltd., whose General Manager, Mr. Arthur Docking, was responsible for the design on the well-known principles patented by that firm. The initial contract has been for two furnaces; but there is ample room for two or three more if occasion demands. They are finished in cream vitreous enamel, with chromium-plated pipes and fittings, the whole effect being to enhance the impression of cleanliness and efficiency already alluded to with reference to the furnace-room.

Gas at town's pressure supplied by the Wandsworth and District Gas Company is introduced by a 4-in. main and passes to a 6,000 cu.ft./hr. meter placed in a separate chamber adjoining the furnace-room. In this chamber, which is referred to as the control room, is all the other ancillary equipment. A safety cut-out valve prevents gas passing to the furnaces when the fans are not running, while a pressure valve precludes the possibility of air getting back into the gas main. The safety cut-out device is so arranged that, in the event of a failure bringing it into operation, the gas supply cannot be restored except by the manipulation of a needle valve.

There are two fans, which can be used alternatively, each of a capacity of 40,000 cu.ft./hr., providing a pressure of 12 in W.G.



One of the Chapels, showing the Radiant Heaters in the Apex of the Roof.

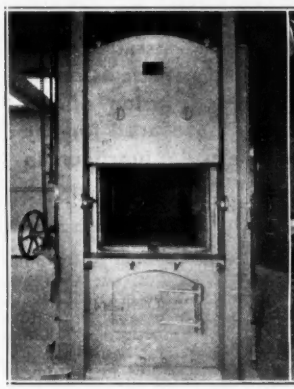


The Waiting-Room, also equipped with a Radiant Heater above the clock.

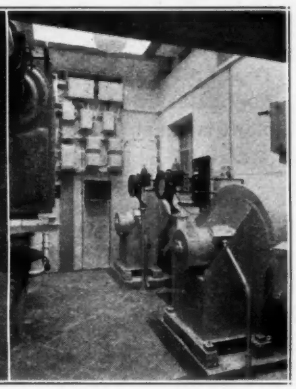
The air then passes by means of a 6-in. supply to preheaters in the top of the furnaces, where it is preheated to 600° F. Being on the top of the plant, the preheater and fittings can be examined without dismantling any part of the furnace. Approximately 12,000 cu.ft. of air per hour is provided on each furnace to assist combustion and eliminate smoke.

The gas is brought to the furnace through a 2½-in. supply and

is mixed with the air in a specially designed venturi tube before passing forward to the burners, which are set in the walls of the furnace. The burners employ the Radiant Heating system of surface combustion, and no gas flame enters the furnace; the consumption of the coffin and its contents is promoted by radiant heat only, and only self-combustion takes place actually inside the furnace. There is, therefore, nothing to offend the susceptibilities of even the most sensitive, as has on occasion been suggested by the use of "gas flames." There are three burners on each side of the furnace and two on each side of the ash pit below—the latter to calcine the remains that fall into the ash pit. The ashes are subsequently withdrawn into the urns previously mentioned.



Front View of one of the Gas Furnaces, showing the bars on which the coffin rests. The ashes are withdrawn through the door below.



The Control Room, containing the Gas Meter (on left), the two fans (on right) and various other controlling and recording instruments.

The temperature within the furnace during cremation is of the order of 800° C. The time taken for the first cremation is approximately 1¼ hours, reducing to an average of 40 to 50 minutes for each subsequent cremation. The furnaces are fitted with direct reading pyrometers with distant recorders in the control-room, where also are placed flow and total-index meters. Main dampers are provided at the outlet of the furnaces, these being closed during the heating-up period and opened as soon as cremation commences.

The downward system of ventilation is adopted, the main flue from the furnaces passing under the floor before rising up a vertical chimney, 35 ft. high, terminating in a specially constructed "pinnacle" or tower above the centre roof of the chapels. This flue outlet is fitted with louvres for the removal of the products of combustion, and it harmonizes well with the general architecture of the building, being a smaller counterpart of the belfry above the front porch.

The Heating Units.

The chapels are each fitted with radiant heaters set in the apex of the roof. Two units, measuring 8 in. by 18 in., are provided in each chapel, their height above the ground being about 25 ft. In spite of this quite considerable height, however, the warmth from the heaters is distinctly noticeable on the ground, and a comfortable temperature in the chapels can be attained within a quarter-of-an-hour to twenty minutes from lighting up. The heating units are directly controlled from the basement and separately metered. A small fan provides the necessary air at a pressure of 4 in. W.G., and similar safety devices are fitted in case of failure. Another heater is installed in the waiting room, and this is shown in one of the accompanying photographs. These units consume 120 cu.ft./hr. each and are vented by means of a duct running the whole length of the apex of the roof above the heaters. This duct has open ends and so adequately disposes of the products of combustion no matter in which direction the wind is blowing.

Altogether this plant at Putney Vale is one of outstanding interest, providing an example of the very latest method of gas cremation. Messrs. Radiant Heating, Ltd., are to be congratulated upon a notworthy installation and for showing how the Gas Industry can lead the way in providing another public service which is bound to be of increasing importance as time goes on. An interesting brochure describing the plant in detail is being prepared by the firm, which will serve as a useful guide to undertakings in submitting proposals for gas crematoria in their areas of supply.

Athletic and Social

Ascot Gas Water Heaters' Annual Outing.

An immense family party descended upon Margate on July 2 to enjoy the fifth annual summer outing of Ascot Gas Water Heaters, Ltd. A special train conveyed nearly 500 employees to a particularly sunny Margate and to a long day by the sea. A splendid luncheon was provided at Dreamland, during the course of which Dr. Bernard Friedman (Managing Director) was greeted with cheers and song by the assembled guests. Addressing the party, Dr. Friedman first welcomed the special guests and expressed his pleasure as a member of the huge Ascot family on this day of days. He added that the welfare and happiness of the employees had always been his foremost concern, and on such an occasion as this it was most heartening to see that the hard work done in past years was bearing such admirable fruit in uniting the employees together in bonds of personal sympathy and interest. Dr. Friedman spoke of the magnificent new canteen at Neasden which is to be opened this year and dedicated to the well-being of the staff and gave his assurance that no efforts would be spared to afford every possible facility which could be provided by the Company for the enjoyment and welfare of all concerned.

After lunch the party dispersed on bathing expeditions, walks, fun and games in the Amusement Park, and sea trips, eventually assembling at the station at 9.30 p.m., where they entrained for home tired but happy.

Co-Partnership Festival at South Shields.

Despite the unfavourable weather there was a large attendance at the annual co-partnership festival and sports of the South Metropolitan Gas Company held at Harton Recreation Ground, South Shields, on Saturday. There were many visitors from London, including Mr. F. H. Jones (President of the Company), Major F. J. Bywater (Comptroller and District Manager), Mr. F. G. Brewer (Secretary), Mr. F. Hughes, Mr. J. D. Payne, and Mr. A. Lee (Directors). The prizes were presented by Mrs. C. Johnson. Selections were played by the band of the Tyne Division Royal Naval Volunteer Reserve. There was a large entry for the children's sports.

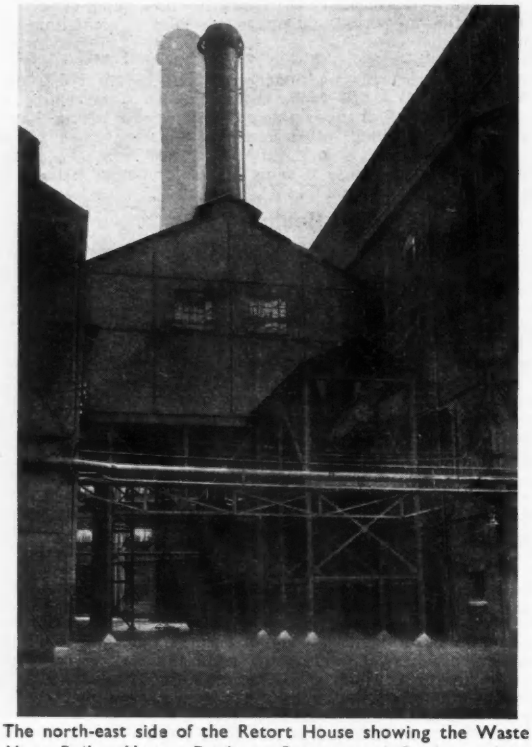
Presentations to Wolverhampton Employees.

An enjoyable evening was spent on Friday, June 24, by the staff and employees of the Wolverhampton Gas Company in their Sports Pavilion, when presentations were made to eleven employees retiring on pension. The aggregate of their service exceeds 400 years. They were: W. Hudson, W. Coxsell, R. Hutton, C. Smith, G. Hughes, G. Taylor, A. Shorthose, E. Scriven, H. Pote, J. Cresswell, and B. Evans.

Mr. A. H. Cranmer (Chief Engineer to the Company) made the presentations and was supported by Mr. J. C. Neve (Chairman of Directors) and Mr. A. G. Williams (Commercial Manager and Secretary). Mr. W. Macnaughton (Assistant Engineer) was in the Chair. The presentations consisted of suitably engraved silver watches, which were subscribed for by every employee of the Company. The Smoking Concert was arranged by Mr. W. A. Hopwood, who also conducted the community singing, which held a prominent place in the programme. The retiring members all left with the best of wishes for a long and happy retirement.

New Woodall-Duckham Plant at Rochdale

Wednesday of last week saw the official inauguration by Councillor A. Ashworth, J.P., Chairman of the Gas Committee, of a new installation of W-D upwardly heated continuous verticals at the Rochdale Gas-Works. Our description of the plant is taken from a brochure prepared for the occasion, which was marked by a luncheon in Rochdale's fine Town Hall.



The north-east side of the Retort House showing the Waste Heat Boiler House, Producer Battery, and Producer Coke and Breeze Chute and Gantry.

Some three years ago the Rochdale Gas Committee were faced with the position that their carbonizing plant showed the need for complete renewal. The local sales of coke had fallen off considerably, due to ineffective screening of the coke, and the showroom was badly in need of modernization. So far as the carbonizing plant is concerned, it was decided to erect one large unit of flexible design but capable of manufacturing all the gas required to supply the consumers. It was decided to build the new plant in the Woodall-Duckham retort house, which provided adequate space for plant of the necessary capacity and a possible future extension of 25%. A tender was finally accepted for the supply and erection of such plant by the Woodall-Duckham Company, and work was commenced on Sept. 28, 1936.

The reconstruction involved the dismantling of the existing bench, comprising four settings, each of four downwardly-heated W-D 76 in. retorts and each provided with its own producer and recuperator, and its replacement in the same retort house by a bench of 24 of the latest type upwardly-heated 76 in. retorts, fired by means of a separate battery of four breeze-burning producers. Space has been left in the retort house for a future extension of six retorts.

The scheme also included the reconstruction of the coal handling plant so as to provide alternative arrangements for feeding coal to the plant, either from the existing store or direct from road vehicles; modifications and additions to the coke handling equipment; the repositioning of the existing waste heat boiler and the installation of an additional new boiler; and the provision of a new chimney.

The heat losses resulting from the abolition of recuperation have been more than made good by the employment of a larger degree of waste heat recovery by means of fire-tube boilers than was possible with recuperative retorts, and at the same time the initial and maintenance costs associated with recuperators have been eliminated.

In the present instance the new bench is capable of carbonizing 180 tons of coal and producing 3,060,000 cu.ft. of 475 B.Th.U. gas per day, whereas the old bench could carbonize 112 tons of coal and produce 2,016,000 cu.ft. of gas per day.

Retort Design and Heating System.

The new retorts at Rochdale are designed according to the latest Woodall-Duckham practice. To provide for portions of the plant being closed down during light load periods or for other reasons, the retorts are built in four groups of six, with air-cooled division walls between each group and the next.

The heating system incorporates a number of special features recently introduced into Woodall-Duckham practice. While the well-known vertical flue construction is retained, which ensures rigidity of the retort structure and also facilitates inspection of flues from one level, the combustion of the heating gases takes place in an upward instead of a downward direction. This permits a zoning of heats which has been found to give perfectly regular coal travel, less scurf formation and less loss of time at scurfing periods, and better steaming conditions.

The Woodall-Duckham system of upward heating, which follows the natural flow of hot combustion gases, is particularly simple to put into operation and to control. When the heats have once been regulated, only the producer gas and waste gas dampers need adjustment.

First quality silica material is used for constructing the retort faces and combustion chambers in the zone of maximum temperatures, but the introduction of the upward heating principle has resulted in the temperatures in the combustion chambers being sufficiently reduced at the point where erosion of silica normally takes place to permit the retorts to be constructed at this level with perfect safety in firebrick. By the time the coal has travelled past this belt of firebrick and enters the silica portion of the retort, it has acquired a sufficient heat to avoid the extreme differences in temperature on either side of the retort wall, which are the main cause of the erosion of silica material. In this way the full advantage of silica construction as regards high throughput of coal is obtained, with a reduction in maintenance costs. Both the side walls and the top of the bench are insulated, with the double object of improving the working conditions and saving fuel.

In the reconstruction at Rochdale it was found possible to retain the setting steelwork and develop the bracing so as to be suitable for the modern retort.

It was found that the bottom castings from the replaced retorts were fit (after being reconditioned and provided with certain new parts, necessitated by wear and tear) for re-use on 16 of the new retorts, though, of course, complete new sets had to be provided on the extra eight retorts.

In the latest Woodall-Duckham bottom retort castings special easy access is provided for inspection and spraying of the retorts without dismantling the castings. In addition to this provision being made in the eight new sets of bottom castings, it was incorporated in the reconditioning of the existing sets.

The vacuum in the collecting main at each side of the retort setting is controlled by a Braddock retort house governor; one of these governors is the old retort house governor reconditioned and re-used, and the second one is a new governor of similar capacity.

Producers.

To supply the gas for heating the retorts, four producers are provided at the retort house floor level below the waste heat boiler house. The producers are arranged so that any producer may be shut down without interfering in any way with the working of the other producers. Two producer gas mains are provided, one built into the producer battery, and a second one, steel-cased and refractory-lined, situated alongside the retort setting. These two producer gas mains are connected by two steel-cased refractory-lined uptakes, and dampers are provided so that each producer gas main can be divided in the middle into two sections. Thus arrangements are provided whereby gas from any producer can be passed to any group of retorts. Further, sections of these producer gas mains can be opened out for inspection and repair while the remaining portions of the mains are at work.

The producers are of the step grate type and are constructed

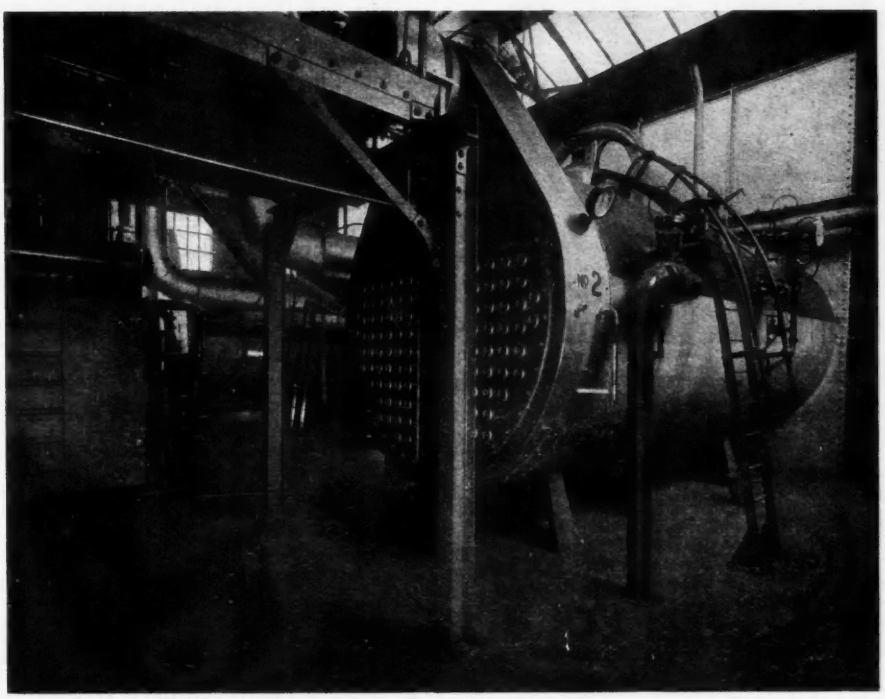
The top Charging Platform, showing the Coal Storage Hoppers, the Coal Valves, and Auxiliary Hoppers, the sprayed Gas Offtakes, and the Retort House Governors.

with ample grate area for the efficient heating of 24 retorts when using a mixture of coke and breeze, as well as for burning the additional amount of fuel required for a supplementary supply of producer gas to the waste heat boiler. The step grate eliminates the need of clinkering. The only attention required to keep the producer fire in proper condition is a periodical pricking up at intervals of four hours or longer, dependent on the class of fuel used.

The waste gas main conveys the gases either directly to the chimney or to one of the two waste heat boilers which are provided for utilizing the major portion of the heat contained in the gases. The waste gas main and the base of the chimney are each divided into two compartments by a permanent wall, and dampers are arranged all in horizontal positions, by the suitable adjustment of which waste gases may be passed to either or both waste heat boilers or to the chimney. Further, one half of the waste gas flue can be examined and repaired while the other half is at work.

Waste Heat Boilers.

Two waste heat boilers are installed, one being the existing boiler which has been re-tubed, reconditioned, and provided with certain new fittings. The new boiler, like the existing boiler, is of the Woodall-Duckham horizontal firetube induced-draught type, and

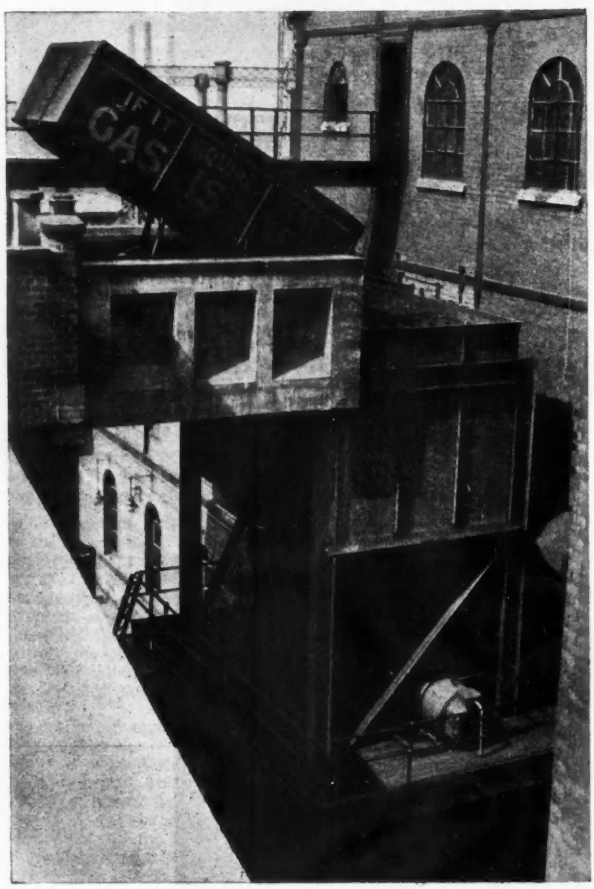


The Waste Heat Boiler Platform, showing the Two Boilers, and the Feed Water Tank.

is designed for a working pressure of 120 lb. per sq.in. Either boiler is capable of dealing with the waste gases from 24 retorts.

In order that there may be available for general works purposes a surplus of steam in excess of that which would result from the use of the waste gases alone, provision is made so that a supplementary supply of producer gas can be mixed with the waste gases before they are passed to the boiler, a supplementary combustion flue being provided.

A 25-tons capacity steel receiving hopper has been installed in an elevated position between the coal store and the retort house. In order that road vehicles may deliver coal direct into this hopper, a reinforced concrete access gantry about 10 ft. wide has been erected between the roadway over the coal store and the top of the hopper. This gantry is provided with a reinforced concrete parapet at each side, and with a tipping beam. Coal received into the hopper is discharged on to an inclined drag bar feeder, which ensures even feed of coal to the coal breaker. The breaker is the existing machine re-positioned, and in order to deliver coal to it from the coal store, the existing tray conveyor



A Vehicle on the new access Gantry tipping Coal into the new Reception Hopper.

has been dispensed with and a totally enclosed bucket elevator of 40 tons per hour capacity has been installed.

To provide storage for coke and breeze for the producers and to fill the retorts after scurfing or at starting up, a new steel hopper has been installed at the coke screening plant end of the overhead storage hoppers. This hopper is divided into two compartments, one for coke and one for breeze,, and its capacity is equivalent to 24 hours' supply to the producers.

The drag bar feeder, elevator, coal breaker and lip bucket conveyor have all been provided with totally-enclosed electric motors of a special gas-works dustproof design. The electric current for these motors is generated in steam-driven generating plant supplied with steam from the waste heat boilers, the installation at present comprising a 20 kW direct-coupled Browett-Lindley set generating current at 220 volts, D.C., together with a stand-by gas engine driven set of similar capacity.

Boiler Feed Water Treatment Plant.

The question of treatment of the water fed to the waste heat boilers has also received attention, as it was found that the water supply at the gas-works in its untreated state was not suitable for use in the modern high efficiency boilers fitted. These boilers are run at a relatively high inlet temperature (900° C.) and have a very large evaporation per square foot of heating surface.

The water used for steam raising purposes on the works consists of a mixture of town's water of 4° to 5° hardness, and spring water of approximately 10° hardness, the hardness in both cases being mainly permanent hardness.

After careful investigation of the types of water treatment plant available it was decided to install one of the "base exchange" type, and a tender was accepted from the Permutit Company for the supply and installation of water softening and conditioning plant capable of dealing with the water requirements of the two waste heat boilers and the two stand-by Lancashire boilers which are situated in the boiler house adjoining the carburetted water gas plant. The water treatment plant has now been operating for six months in a very satisfactory manner.

Coke Screening and Bagging.

The requirements of the present-day coke market are that coke shall be carefully screened, free from dust, and closely graded in regard to size. The coke screening plant installed some twelve years ago at the Works comprises a preliminary static screen for the removal of a large proportion of the coke breeze, and a screen of the rotary drum type for grading, these two screens being situated above the coke storage bunkers.

It was found that while these screens performed the function of dividing the coke into the relative sizes required, a large proportion of breeze was still present in the two sizes of graded coke. This was largely due to the inefficient removal of breeze by the preliminary static screen and also to breakage of coke falling from the main screen into the bunkers. It was decided that in order to ensure complete freedom from breeze in the coke as sold it was necessary to install debreezing screens under the loading chutes from the coal bunkers. Furthermore, it was possible, by choosing the size of mesh installed in these debreezing screens to assist in the closer grading of the chosen sizes of coke. On account of this latter requirement the size of debreezing screens chosen is somewhat larger than is usually the practice for debreezing only.

Six Fraser & Chalmers "Gyrex" screens, each of 25 tons per hour capacity, were installed, and are suspended on vibration damping hangers below the respective loading chutes under the coke bunkers. Fully automatic push-button operated starters are fitted to the motors on the screens.

It is found in practice with the size of screen fitted that there is very little delay over the length of time normally required for loading vehicles direct from the chutes, and the coke now obtained from the screening plant generally is closely graded and quite free from dust and small sizes.

By the Rochdale Corporation Act of 1937 an obligation was imposed upon the Gas Department to sell bagged coke precisely by weight. Accordingly the question of dealing with the weighing of a large number of bags had to receive attention. The possibility of installing completely automatic bagging and weighing plant was considered, but the cost of this relative to the amount of coke to be dealt with was considered to be too high. It was finally decided to install two Avery predetermined load weighing machines complete with tare setting device and sack grips. These two machines are installed immediately below the outlet chutes of the debreezing screens dealing with the sizes of coke sold for domestic purposes. It is found that with their use the bagging of correctly weighed coke can be carried out fairly expeditiously.

Showrooms.

The record of the past three years would be incomplete without some reference to the showroom and sales activities of the Department. Complete reorganization of the sales policy of the Department has taken place, together with the appointment in 1935 of a Sales Manager. The Showroom in Drake Street has been reconstructed and its interior modernized. It was officially reopened on Sept. 2, 1936.

The sale of appliances shows a very marked increase and during the financial year just ended has reached a figure double of that of three years ago.

LUNCHEON.

Prior to the inspection of the works the visitors were entertained at luncheon in Rochdale's fine Town Hall, Councillor A. ASHWORTH, J.P., Chairman of the Gas Committee, presiding.

The toast of the County Borough of Rochdale was proposed by Mr. F. B. RICHARDS, Chairman of the Woodall-Duckham Companies, who said that the long and pleasant business association which his firm had enjoyed with Rochdale had recently been renewed in the execution of the new works. He gave a very interesting outline of the development of Rochdale's industrial

life from the time of the Flemish migration to the town in 1350 to the present day. Rochdale, he said, was fortunate in the diversity of its industries, and it was also fortunate in having a first class gas supply at a price which should prove an inducement to its greater use in both home and industry.

Response to the toast was made by Councillor C. CROWDER, J.P., the Deputy Mayor, who referred to the part played by gas in the life of a municipality. Gas made for a healthier and a cleaner town, and Rochdale was endeavouring to give to its people the full amenities of a plentiful and economical gas supply.

Mr. E. ASTBURY, President of the Manchester District Association of Gas Engineers, then proposed the toast of the Rochdale Corporation Gas Department. He said that those who had had the opportunity of reading the brochure which had been prepared for the occasion would appreciate the excellent manner in which the work had been carried out by Mr. Bamber. The reconstruction was evidence of the foresight of the Gas Committee, and the new plant would be a means of keeping the price of gas as low as possible in face of keen competition, rising costs of labour and materials and large—and, he thought, unjust—increases in the cost of coal. Mr. Astbury spoke of the effect of coke sales on the price at which gas could be offered to the public, and in this connexion emphasized the need for regularity in the supply of coke to consumers. Given uniform quality the public would be prepared to use coke in preference to raw coal. Gas and coke, he concluded, provided a smokeless fuel service which should be universally adopted.

Councillor ASHWORTH, responding to the toast, mentioned the difficulties with which the contractors had been faced in regard to the delivery of steelwork; they had, however, overcome these difficulties in a manner worthy of the reputation of the firm. The plant was working most efficiently and satisfactorily and to some extent would offset the increased costs of raw materials, especially coal, and of labour. Councillor Ashworth gave figures to show what these increases meant to the Department.

The final toast, that of the Visitors, was in the hands of Mr. CECIL H. BAMBER, Engineer and Manager to the Department, who voiced his appreciation of the work carried out by the Woodall-Duckham Company. The work on the retort setting had to be undertaken in two stages; despite the risks incurred, however, by such a two-stage method of building, the outcome was completely satisfactory. The Gas Committee felt very proud of what had been accomplished at the gas-works during the past decade. Every effort had been made to introduce the most modern methods of manufacture; and he would like to express his appreciation of the Committee's ready interest in and support of any schemes he had put forward during the past three years. Thomas Hardy said that "nothing is so permanent as change," and this statement could be aptly applied both to the Gas Industry and, he hoped, to the Rochdale undertaking. The change in the nature of their Industry was, he felt, testimony to its permanence. It was constantly changing, constantly becoming new, ever increasing its manufacturing efficiency and its distribution processes; it devised new apparatus for use in home and industry; it was developing quietly, steadily, and without State assistance.

Response to the toast was made by Alderman C. H. BRYNING, J.P., Chairman of the Lighting Sub-Committee, and Mr. F. G. SHAW, Engineer and Manager to the Buxton Gas Department who congratulated Mr. Bamber on the successful conclusion of an anxious and arduous task.

Opening Ceremony.

The visitors were then conveyed to the works, where, after the official inauguration by Councillor Ashworth, a thorough inspection was made of the new plant.

"Time Marches On"

Where is Manufactured Gas Marching?

From a Paper by A. M. BEEBEE, General Superintendent Rochester Gas and Electric Corporation, Rochester, N.Y., at a Joint Committee Conference of the Production and Chemical Committees of the American Gas Association.

I know of no better way to analyze this problem than to assume for a moment that we could turn the hands of time back and start to build America all over again, with, however, all of our technical knowledge of to-day available. Let us assume America was still only inhabited by the Indians, and that overnight we could build it up in any fashion that we chose as being most in keeping with our present-day technical knowledge.

When we make a survey, we find that the reserves of coal in this country are tremendous and that the known reserves of oil and natural gas in this country are definitely limited, in spite of the present apparent flood of these materials. We find that the total known oil reserves of the country at present rates of use will last some 12 to 13 years and that the tendency to develop new reserves during the past five years is considerably below present rate of use, in spite of increased knowledge of geology and geophysical exploration. The more obvious geological conditions have been picked and deeper and deeper drilling has been carried out, so that the cellar of sedimentary rocks has been approached. As time goes on the popular impression that we merely drill deeper and get more oil has a very definite limit. This is an important point to be considering, because oil now supplies some 30% of our total energy requirements.

Natural gas is in a relatively similar situation. This is especially true in the total Appalachian fields east of the Mississippi. The mid-continent and California fields, however, are tremendous, so that total known reserves in this country will last present rates of withdrawal from 20 to 25 years. Gas is a bulky substance. You can put 10 gallons of gasoline in your car and drive all day. To do the same with gas, even if compressed to 2,500 lb., requires a tank ten times as large. This means that for natural gas fields to be commercially successful a well must drain "reservoir" rocks of ten times the capacity of that necessary for a commercial oil well. The location of "reservoir rocks" of such porosity and thickness and of adequate permeability are few and far between, though gas, by reason of its greater "migrating power," due to its lesser viscosity tends to offset this great handicap. Natural gas we find now supplies some 7% of the nation's energy requirements.

Coal, on the other hand, we find, up until a decade ago supplied some 60% of our energy requirements, though due to the increased development of natural gas, oil, and water power, now supplies but 45% of our energy requirements. Yet we find this country has a coal reserve which at present rates of use will last over 4,000 years, and if used at a rate to supply nearly all our requirements will last some 2,000 years.

At the risk of repetition, I am going to present again a statement made in a Paper before this Association two years ago, because it visualizes the importance of coal in our picture which we are trying to develop. Few realize that the energy in a pound of coal is some four to five times that in a pound of our most powerful explosives, such as T.N.T., and that a ton of water must fall a mile to develop the energy equivalent of a pound of coal. When all conversion efficiencies are considered, it must fall a quarter of a mile to produce in electrical form the energy that can be generated from a pound of coal. It is interesting to note that the entire flow of the Niagara River over the great Niagara Falls is only equivalent to an imaginary coal stream flowing at a rate only slightly faster than a walk in a pipe line only 18 in. in diameter.

From all the above, we cannot help but conclude that coal is the source of energy of the future in this country, and that as time develops, the tendency of oil and natural gas to crowd out coal will reverse itself in the very near future.

At this point it may be well to digress at the risk of repeating what has been previously presented ("Economics of

Energy Distribution "—1936 A.G.A. Convention) two years ago, and state two most important factors that seem self-evident, and which justifies their being repeated, as they cannot be emphasized too strongly, especially at these times.

(*a*) The tendency to return to coal and the resultant spreading of employment and purchasing power, both at the mines, railroads, and plants, and the heavy industries which supply these industries, would seem again to set in motion the favourable economic cycle which existed in the period 1923 to 1929 when coal was 60% of our requirements, instead of the present 45%, which latter resulted from the increased use of water power, oil, and natural gas, which forms of energy use a minimum of labour in their production.

(*b*) It is almost suicidal folly to develop hydro-electric power (which is the world's worst employer of labour) in a country such as ours, which has adequate coal reserves.

The testimony by the National Coal Association before the Senate hearing on July 1 last showed that the present hydro-electric developments of the Government are equivalent to 139 million tons of coal a year or 31% of the 1936 Bituminous coal production, and that the proposed plants will have a capacity of an additional amount equivalent to 199 million tons a year, or 45% of the 1936 coal production. The combined present and proposed hydro programmes equal 338 million tons, or 76% of the 1936 coal production.

The testimony just referred to showed that 50% of coal freight revenue goes to labour, and 65% of the cost of producing coal goes to labour, and that each ton of coal lost to hydro power represents the loss of one day's work directly or indirectly employed in production and distribution of coal. Thus, these figures indicate that the Government's total hydro programme involves the loss of 338,000,000 days' work or the work of over a million men steadily 50 weeks of a year. It seems that this is indeed a sizable item in our unemployment situation.

Now to get back to our subject—the method of supplying the energy requirements to this America which we can build overnight. Again we must consider some basic fundamentals. Gas and electricity are merely convenient means of transporting energy. In a modern America, the first thought would naturally be to have just one form of distribution; and perhaps to eliminate the two present forms of distribution. Some of our modern social planners appear to have fallen for this illusion. The energy in the coal at the mines can therefore be transported to market by rail in the form of coal or by conversion to gas, or by conversion to electricity. We have all heard of the ideas of gas plants located at the mine mouth, and of electric plants located at the mine mouth. Let us see what the general economics are.

Coal can be transported with a thermal loss of but a fraction of one per cent. In the form of electricity the transmission losses run from 10 to 17%, while in the form of gas the energy losses, including pumping requirements, are of the order of a very few per cent. Furthermore, very fine studies have been made recently (Frank F. Fowle, *Combustion*, March, 1938, "Economics of Subsidized Power") which convincingly show that energy can be transported from 4 to 10 times as far in the form of coal on the railroads for the same cost as in the form of electricity by high-voltage transmission. This fact, *plus* the limited condensing water facilities at the mine mouth operations, has blasted the popular fallacy, of a decade ago, of mine mouth electric generation and the high voltage transmission to market.

Railroad transportation of coal for gas plant needs located at the market also is sound and will probably continue in the future.

Therefore, whether gas or electricity or both is used to distribute the energy at the market to the many customers, coal is going to be transported by the railroads to the market to supply those needs.

Now when we come to analyze as to whether we should have one form of energy distribution or two at the market we again must consider some fundamentals which may need repeating here. Energy in the form of fuels can be converted into useful heat with a high degree of efficiency even when including the conversion losses from coal to gas. However, where the energy in fuels is converted into energy able to do work—*i.e.*, electricity or mechanical energy—large losses of the order of 75% are involved, whether the conversion is made by gas engine, boiler and turbine, or any other known means. To take such energy which has experienced such heavy losses and convert it back into heat to supply heat requirements, which could otherwise be supplied direct from fuels without these losses, is not economic. In general, therefore, *where heat is required, some two to three times the amount of useful energy can be made available to a customer in the form of gas from a given amount of coal, as can be made available in the form of electricity.* Where light and power are concerned, both forms of energy are subject to these same heavy losses and electrical transmission for light and power needs has definite fundamental advantages, due to ease of application, lack of reciprocating parts, freedom from noise, &c.

The energy requirements of a given community in the form of heat are vast indeed, more than is usually realized, and are many times the requirements in the form of light or power. In fact, it may be well to recall that the present average energy requirements of our average American home to-day in the form of gas is some 10 times that in the form of electricity, and the average cost of the 10 times the energy in gas is not much greater than the smaller amount of electricity. Therefore, there are definite fundamental reasons for having both a gas and electric means of conveying energy to a community. Let us see what the utilization side of the question shows.

Streamlined America will certainly want, if it can get it, clean, odourless, cool kitchens with perfect cooking appliances, automatic hot water service, and automatic space heating, without carting fuel through the residential sections of our cities and ashes away for disposal, with all the resultant soot, dirt, and annoyance.

To supply the domestic cooking and water heating requirements there are those who would lead us to believe that the use of electricity for these purposes had latent advantages that enabled it to overcome the inefficiency of the process outlined earlier in this Paper. Such activities, when carefully analyzed, will be found to be promulgated largely by interests selling the appliances, or advocates of the Governmental power programmes, in order to secure the load which they hope will make them self-supporting.

To develop the facts on this perplexing situation many studies have recently been made, nearly all of which have led to the same conclusions. The most interesting of such studies that I have seen are those prepared by Mr. Herman Russell, entitled "Combination Company Sales Responsibilities" and which was given before the New York-New Jersey Regional Sales Conference at Rye, N.Y., June 10, 1937, and the Paper by Mr. R. E. Ginna entitled "Appraising Domestic Competition" before the New England Gas Association 1937 Convention.

These studies are well worthy of careful analysis. They show that combination gas and electric service for cooking, water heating, and refrigeration of the homes in a community is to the best interest of the customer as well as the company and requires an investment only two-thirds that of the all-electric plan. Briefly these studies show that the all-electric cooking and water heating service to the customer is only profitable to the company at a cost to the customer twice the cost of the equivalent gas service, and at equal costs to the customer it is ruinous to the company.

The Authors conclude that "straight electric companies" should "lay off" the range and water heater load as properly belonging to the gas companies and as costly to themselves and the customer. Rochester figures show an investment in supplying an electric range of $285.20. With fixed charges taken as 12½%, and increment energy cost of 4 mills, every electric range added to the lines means an annual cost of $42.83 and revenue of $39.36. Such business is definitely unprofitable to the company and costs the consumer over twice as much as the equivalent gas service.

One recent development which has been a deciding factor in this situation has been the decided improvement in the gas appliances—ranges, refrigerators, and water heaters. The modern gas range is equipped to do a better job in the

kitchen than can be done with competing fuels, including electricity. After studying carefully the claims for electric cooking, there is much that can be discarded. Reliability, uniformity, cleanliness, and coolness—all arguments we have heard so frequently—are not inherent qualities of electricity alone. The apparent cleanliness of electric cooking is a function of the type of cooking (low-temperature cooking) that they have championed, rather than of the fuel itself, which type of cooking can be used with equal success on a modern gas range, but as so aptly put by Mr. Winter, of the Atlanta Gas Light Company, "you don't have to."

Modern electric ranges, to equal gas range speed, have a connected load of 10 by 11 kW, or equivalent to a 15 h.p. motor. The output of an electric range is a function of the square of the voltage and therefore it is most expensive to handle adequately loads of such poor load factor. It is particularly so if uniformity of voltage is to result in order to avoid flickering lights and provide the much touted "uniform" cooking. Here again we have the economic fundamentals definitely on our side, because in the case of gas ranges the output is a function of the square root of the pressure. Therefore, variations in gas pressure affect the operation of gas ranges only to one-quarter the extent that variations in voltage have on electric ranges.

In addition to all the above, the oven temperatures of the modern gas range are far more uniform than in the modern electric range. Try it out for yourself. We did and the results are astounding. With the "on and off" operation of an electric oven, the full effect of the "sun's" rays and radiant heat as affected by shadows in the oven is more of a factor than is ordinarily realized. We found variations of from 50° to 80° in the highest grades of electric ovens, as contrasted with 2° to 3° variations in the gas ovens, which completely accounted for the lack of uniform results which our Home Service girls claimed with electric ovens as contrasted with gas ovens. Gas ovens rely almost entirely on convected heat and therefore are unaffected by shadow and "on and off" operation, since they are capable of throttling control. The heat distribution in a modern gas oven is most remarkable, showing only a degree or two variation at any one point in the oven, as well as when compared with any other points in the oven.

Therefore, *there is a very definite need in this modern America for the two forms of energy distribution,* and the combination company is a sound instrumentality, since there is then less tendency to force either form of energy into markets for which it is not economic, which in the long run is to the interest of the customer and company alike.

Gas Generation Economics.

Now since coal is going to be shipped to market, and combination gas and electric service serves a definite need, we may pause to consider the fundamentals of gas generation and see what the prospects are in this direction.

We have heard much of complete gasification, low-temperature carbonization, high-temperature gasification, liquified gases, gasification with oxygen, water gas, back runs, ignition arches, &c. The main point is: What are the prospects of gas production cost? Since gas can be efficiently converted from coal, and since coal is our most abundant and cheapest form of energy, it follows that gas will probably always be slightly higher in value than coal. There appears no Aladdin's lamp on the horizon to make gas cheaper than coal. However, the efficiency of control with gas and its freedom from refuse, and ease of application, will usually enable it to compete with coal for most refined uses.

The only case where gas may tend to be produced more cheaply than coal for equal amounts of energy is where gas is the result of upgrading of fuels and some of the cost of conversion can be shared by other products, or where the profit on the sale of other products may be returned as a credit. Such a plant is the modern high-temperature carbonizing plant, wherein soft coal is used to produce a smokeless solid fuel, and is thereby upgraded. Likewise, coal in such a plant is upgraded into creosote, tar, pitch, ammonia, and the many other by-products. Such a plant, if properly located as regards freight rates and properly balanced with its gas and coke production to fit its available markets can produce remarkably cheap gas. Such a plant ordinarily should not pipe its gas farther than the resultant coke can be carted efficiently by trucks. This is due to the fact that the coke-absorbing capacity of a gas meter is about a balance with the gas demands of that meter, when both are produced in a modern by-product oven. I have seen many cases of unfortunate economics resulting from carbonizing plants expanding for one temporary reason or another beyond this balance. Piping gas over long distances because of a temporary coke market has resulted later in the need of chasing those long-distance gas meters with coke and the resultant loss on freight charges completely upset the favourable economics formerly enjoyed. One other fundamental that a carbonizing plant must remember is that, if it does ship gas or coke into other than its local markets, it must only do so in the direction of advancing freight rates on coal. Violation of these fundamentals often has created most unfortunate results.

There is still considerable development possible in the coal carbonizing process still further to lower present typical costs, but such plants require careful planning to fit their resultant markets of by-products.

It is difficult to become enthusiastic in this country on any process of low-temperature carbonization, because of the relatively inferior quality of the resultant coke. In other words, there is no particular upgrading taking place and therefore nothing to carry part of the burden of gasification.

The use of cheap oxygen for blasting a producer has long been held as a possible means for producing cheap gas and has intrigued the fancy of many an engineer. However, when all is said and done, the plan has little to offer, since a careful analysis will reveal that a modern blue gas set does everything that a combination oxygen plant and oxygen producer accomplishes, and does so with approximately similar efficiency and considerably less investment. The reason for this is because both processes merely get rid of the diluting nitrogen in the air used for gasification. The only advantage of the oxygen producer is its continuous operation, as contrasted with the intermittent operation of the blue gas set, but it gains this advantage at the expense of an oxygen plant which is a pretty excessive freight charge for a minor point. Unless oxygen can be obtained for from 5c. to 7c. per 1,000 cu.ft. the process has no saving.

When it comes to considering complete gasification a modern blue gas set with waste heat boilers is a remarkably efficient process, though it never will produce a gaseous B.Th.U. cheaper than coal.

Enriching media for the various complete gasification processes such as water gas sets and blue gas sets for many years will be available from unused hydrocarbons of the oil industry, though it is difficult to see how any cheaper conditions for those materials than we now enjoy will result in the future. In fact, the probabilities are to the contrary. However, when these materials increase, the Gas Industry can go more and more to the conversion of a B.Th.U. from coal, and enriching by the recently developed synthetic catalytic process described at length in issue of Nov. 10, 1937, of the British "GAS JOURNAL," covering the Report of the 41st Research Committee of the Institution and Leeds University. The Paper covers the syntheses of hydrocarbons at high pressure and certainly will be food for thought just as soon as an oil-enriching B.Th.U. starts to increase in price.

Therefore we in the Gas Industry may rest assured that we will not have to go very far away from the value of coal to produce our B.Th.U., and in some cases, by co-operation in the upgrading of solid fuels or oils, may make remarkably cheap B.Th.U. that can approach the value of coal. In other words, it would seem that our competitive position with coal and other fuels should improve, if anything, and not get worse.

Gas Market Economics.

In the water heating market an analysis indicates a tremendous field ahead, as this market has only been scratched among the low income groups. Furnace coils and jackpots with all their drawbacks are still the general method of heating water, and yet tests carried out at the Massachusetts Institute of Technology show that with modern automatic water heaters, under average manufactured gas rates, the

same amount of water can be heated for approximately the same fuel cost as a furnace coil or jackpot. All we need to do is to get the public conscious of the fact that furnace coils and jackpots are not good economy and we can unlock a new market which will double our existing markets. This market will yield very profitable returns and will have very desirable load characteristics.

One other study recently made that is worthy of consideration is that of the 1936 A.G.A. Committee on "Economics of Gas House Heating." This study contains a great deal of valuable data and showed that, in general, the gas distribution systems of the country have a tremendous undeveloped capacity and that substantial amounts of house heating can be taken on the average typical distribution system with very little additional investment.

One of the major conclusions of that Committee might well be quoted here:

> "Based on the study of 4 different types of community the average distribution system has sufficient spare capacity to serve 20% house heating saturation with but few changes." (The fundamental involved is that in congested areas the houses are smaller, and *vice versa*, so that both types of community are similarly affected.)

The remainder of that report contains much valuable data on this important subject, and indicates where the point of increasing costs, as a result of added saturation, crosses the decreasing revenues due to the lower rates necessary to obtain the increased saturation. The study showed that with 25c. cost of production with manufactured gas the percentage saturation of house heating improved net earnings up to a 10% saturation, while with 20c. gas the improvement continued to 15% saturation.

Thus we see, after careful analysis of our situation, that manufactured gas has a very definite place in a modern streamlined America, and that the effect of the various storms on the horizon would seem not to be as serious as we sometimes may think.

Trends of the Manufactured Gas Industry.

If all the above is true, some may well question why the various data showing such disturbing decreases in our output, which have been used by many financial investigators to forecast the impending doom of our manufactured gas industry. It is true that during the depression we faced a flood of competing fuels in an already glutted energy market. In addition most data that we have seen used, compare this year's operation with other years, which contain many properties which have since been converted to natural gas, and as a result distorted figures result.

Figures based on sales per customer theoretically should correct for this error, and here again we find factors that tend to create false impressions. We must bear in mind that the manufactured Gas Industry is supplying a relatively saturated cooking market in a country approaching a stationary population. Gas has been the universal fuel for cooking, and our new customers have not, except to a negligible degree, come from extensions into new territory or the development of rural territory. Such new customers as we have obtained have been largely the result of expansion of those who doubled up in the rigours of the depression. In other words, they are not new customers, but old ones in new locations, and in their former houses used gas for cooking and water heating. In the case of electricity usually line extension into new territory or a new refrigerator or a new radio is brand new load, while gas loads are apt to be merely transferred load.

Furthermore, sales on a per customer basis give a false interpretation, because many manufactured properties have gone to higher thermal value gases—800 B.Th.U., &c., such as St. Louis, Chicago, Washington, Binghamton, Syracuse, &c., which on a 1,000 cu.ft. per meter basis leads to incorrect and unfavourable conclusions.

Therefore, to analyze a little closer and to try to overcome both of the objections mentioned above, it may be found interesting to look over the monthly figures showing the gas used by various classifications in the manufactured Gas Industry, as shown in the monthly bulletin published by the A.G.A. These figures are self-corrective in that if a company this year has been converted to natural gas, the figures used as a comparison for the previous year have been put in their proper location.

We must bear in mind that the Gas Industry already is a heavy purveyor of energy and in actual energy units is delivering some 10 times as much as the electric industry delivers to a domestic consumer. Therefore, to show a 10% increase we must add as much load as would be equivalent to a 100% increase in the electric load. In other words, it is much harder for us to show the same percentage of increase.

With all these facts in mind it is interesting to analyze the following data:

—	Total Manufactured Gas Sales.	Revenue.
	%	%
1934	+ 5·8 increase	1·0 increase
1935	+ 3·6 ,,	−0·1 ,,
1936	+ 6·6 ,,	1·7 ,,
1937	+ 4·0 ,,	1·2 ,,

The preceding table is quite contrary to our general impression and is indicative of a pretty healthy rate of increase for the entire load. However, let us break this down and analyze the component parts.

Manufactured Gas.

—	House Heating Sales.	Revenue.	Commercial and Ind. Sales.	Revenue.
	%	%	%	%
1934 ..	42·6 increase	33·5 increase	18·0 increase	5·0 increase
1935 ..	24·1 ,,	20·0 ,,	12·6 ,,	3·8 ,,
1936 ..	22·0 ,,	16·8 ,,	20·7 ,,	11·7 ,,
1937* ..	11·0 ,,	9·2 ,,	11·1 ,,	4·5 ,,

* Mild Winter.

Both of the above, especially when considering the mild 1937 winter, are indicative of a very healthy and steady increase.

Now let us analyze that phase which we have assumed to be the sickest as well as the backbone of the Industry—namely, the domestic market.

Domestic Manufactured Gas.

—	Sales.	Revenue.
	%	%
1934	− 1·0 increase	− 1·4 increase
1935	− 2·4 ,,	− 2·3 ,,
1936	− 1·6 ,,	− 2·0 ,,
1937	− 1·1 ,,	− 0·5 ,,

The smallness of these decreases, in spite of our usual feeling, is the first fact that attracts attention. Then we notice that the last 3 years show each year a progressive reduction in this decrease. And then when we analyze Table I. for the domestic gas for the year 1937 we find that for the last 9 months the domestic gas has shown a steady, though slight, increase, with the exception of two months.

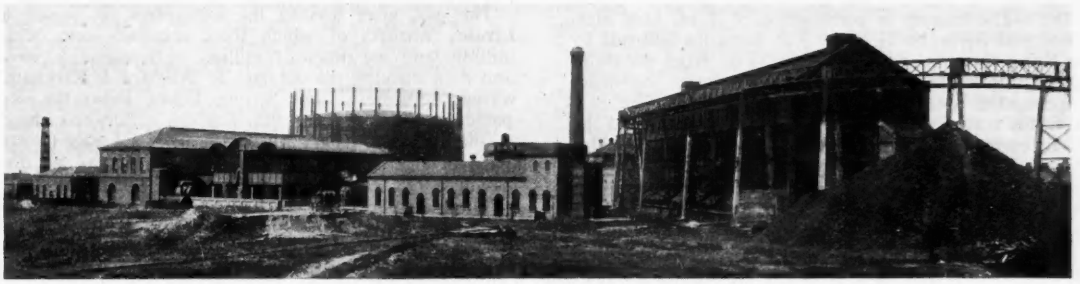
TABLE 1.—*Manufactured Domestic Gas.*

[% Increase.]

—	1934.	1935.	1936.	1937.
January	− 2·2	− 4·5	0·9	− 3·3
February	2·0	− 6·2	3·4	− 9·6
March	1·4	− 8·9	1·0	− 2·5
April	− 2·0	− 4·4	0·2	0·5
May	− 1·1	− 1·1	− 1·6	− 2·4
June	− 0·7	1·0	− 4·2	0·3
July	− 2·3	1·7	− 1·8	1·3
August	− 2·3	− 0·9	− 3·1	1·5
September ..	1·5	− 1·5	− 5·9	1·1
October	− 0·7	− 0·6	− 1·4	0·3
November ..	− 1·8	− 1·0	− 2·8	− 1·7
December ..	− 3·7	− 0·7	− 1·7	2·7
Total ..	1·0	− 2·4	− 1·6	− 1·1
Increase total year revenue ..	1·4	− 2·3	− 2·0	− 0·5

Further study of the domestic gas figures given in Table I. shows that except during the cold first few months of the 1935-1936 winter, since June, 1937, is the first sustained period of the domestic load that shows an increase. The month by month domestic figures up to June, 1937, show a consistent and regular downward trend, and since then a sustained increase. May this not then be rightly viewed as an indication of the turning point. Certainly it will be interesting to follow as time goes on.

Manchester Association at Garston



General View of the Garston Works

We give below a description of the Garston Works of the Liverpool Gas Company which were visited by the Manchester District Association of Gas Engineers on July 1. In last week's "JOURNAL" were reported the speeches at the luncheon which preceded the works inspection.

The Garston Works is the second largest station of the Liverpool Gas Company, the total manufacturing capacity of the coal gas and carburetted water gas plants being 12 million cu.ft. *per diem.*

The coal is received into the Works by sidings connected with the Garston branch of the London Midland and Scottish Railway, and the wagons are discharged by means of a rotary tippler into a hopper with bottom doors leading to the coal breakers. Each breaker has a capacity of 40 tons per hour and delivers into a gravity bucket conveyor. These conveyors elevate the broken coal and feed the distributing conveyors in both the vertical and horizontal retort houses, which in turn fill the coal storage hoppers. The hoppers in both houses are self-trimming and have a capacity equal to 48 hours' supply.

In the pit housing the coal breakers is an alkali storage hopper, feeding a 1-ton per hour "Redler Abstractor Conveyor" which is used to blend the alkali with the coal as it passes over the reciprocating trays feeding the crushers. The conveyor is driven by a 1-h.p. motor, the switch gear being arranged to cut off the supply of alkali automatically in the event of a stoppage of the coaling plant. In conjunction with this scheme a series of vertical baffle plates has been fitted in an experimental section of the main coal hoppers, to try to avoid segregation of the alkali during storage.

Vertical Retort House.

The retort house itself was erected during 1934 and 1935. In it is housed a bench of sixteen 82-in. Woodall-Duckham upwardly heated continuous vertical retorts, capable of carbonizing 128 tons of coal per day, and giving a yield of 2,184,000 cu.ft. of 500 B.Th.U. gas. The retort bench is designed to be heated by an independent battery of four step-grate producers, at the retort house floor level, and at one side of the retort bench. The producers are arranged for breeze burning, and are connected to a common producer gas flue from which eight branches to the retort setting are taken. In this way it is possible to shut down any one producer without interfering with the working of the others.

The waste gases from the retort setting are conveyed along a brick-lined mild steel main, either to the chimney or to the inlet flue of the waste-heat boiler. The waste-heat boiler is of the horizontal, multi-tubular, fire tube type, with a heating surface of 2,900 sq.ft. and capable of raising 8,100 lb. of steam per hour at 120 lb. per sq.in. pressure.

The coke from extractors is received into cast-iron hoppers, with a capacity equivalent to two hours' maximum make, and fitted with the usual W-D water-sealed dischargers.

From these hoppers the coke may be discharged directly into telpher skips running on rails laid in the floor beneath the retort bench. When filled, the skips are handled by telpher cranes running on a track which extends within the retort house. Alternatively the coke may be discharged into an 80-ton per hour lip bucket conveyor running beneath the retort bench, which elevates it to the top of the coke screening plant and deposits into a buffer hopper.

Horizontal Retort House.

This house was erected during the years 1920 and 1921, and commenced making gas in the early part of 1922. The charging and discharging stages are supported independently of the buckstays and ironwork of the retort benches, and space is left for expansion of the settings between the floors and the firebrick work, thus avoiding thrusts on the main walls of the building.

There are two benches of horizontal retorts each of seven settings of ten retorts. The retorts which are arranged in two rows of five tiers, are of Ω section 24 in. by 18 in. by 22 ft. long. Each setting has one deep producer of ample capacity to carbonize 17½ cwt. per retort in 12 hours. Two 7-in. ascension pipes are fitted to each retort. These have proved satisfactory, for stopped pipes and thick tar in the hydraulic mains are practically unknown. Each section of the hydraulic mains has its own tar main and tar tower—the latter having the usual Weir valve for regulating the seal of the dip pipes. The vacuum in the hydraulic mains is controlled by retort house governors, which are connected to two 18-in. steel foul mains. The retorts are charged by two five-tier stoking machines—a Fiddes-Aldridge simultaneous charging and discharging machine, and a De Brouwer combined charging and discharging machine. Each machine receives coal as it travels from one retort to another through automatic hopper doors fitted to the bottom of the continuous coal bunkers.

On the discharging machine a "G.N." patent coke handling and producer charging machine has been installed. The main feature of the machine is a telescopic tube of special construction, through which the coke slides on being pushed out of the retort. The coke, after leaving the machine, passes through openings in the retort house walls (fitted with automatic doors operated by the machine) on to the inclined quenching bench outside. The coke slides throughout its journey and is not allowed to fall between the retort and the quenching bench; the production of breeze is thus to a great extent avoided. The work is done expeditiously and with a minimum of discomfort to the men.

The quenching bench is inclined at an angle of 35° and paved with chilled cast-iron tiles. The flow of the coke into the skips is regulated by the gates, which are hung horizontally, counter-balanced, and held by a special catch when closed. The coke, after being thoroughly quenched by water from hose pipes, is allowed to enter the skips, in which it is carried by the telpher to the storage hoppers in the water-gas plant. All the surplus water from the quenching bench is collected in a brick sump beneath the bench and used again,

being returned to the hose pipes by an electrically driven centrifugal pump.

The hot coke from the retorts is received in a bus capable of carrying 33 cwt. of coke and travels at a speed of 150 ft. per minute. The hopper is constructed of ¼ in. mild steel plates lined with 2½ in. by 2½ in. by ¼ in. tee-irons laid side by side, the backs forming an inner lining 2½ in. from the outer body. The bottom discharge doors are of similar construction and operated by a pair of suitably shaped closing bars attached to the track in the discharge position. Owing to the difficulty of current collection an over-running type collector is used.

The coke bus track is extended from the end of the retort house to the three Sulzer cooling chambers by means of a gantry. Each chamber is designed to cool 33 cwt. in 80 minutes, the current consumption being 3½ kW per hour, while the steam production averages 3,000 lb. per hour at 115 lb. per sq. in. pressure.

When cool, the containers are tipped by means of an electrically-driven hoist and the coke removed by telpher to the water-gas plant where the use of dry coke results in a considerable saving in generator fuel.

The coke from both retort houses is transported by this plant either to the storage hoppers of the C.W.G. plant or put to stock on a concrete coke store yard.

Three telpher cranes are available, two for handling coke from the retort houses, and one fitted with a grab for removing coke from stock to the C.W.G. plant. A garage for repair work and a switch for changing the order of the cranes on the track are also provided.

Coke Plant.

The coke is delivered into a buffer hopper at the top of the plant by a lip bucket conveyor encircling the vertical retort house. From this it is fed to the coke cutter and the de-breezing screens at the rate of 30 tons per hour. The breeze passes on to a further screen to be graded into dust and peas, which are stored in a hopper 15 ft. square and 22 ft. deep, divided into two parts by a central partition. From this hopper the coke dust is loaded into rail wagons by means of a small band conveyor, while the peas are conveyed to the producer breeze storage hopper at the top of the vertical retort house by the encircling lip bucket conveyor.

From the de-breezing screens the coke is carried along an overhead gantry by a band conveyor to a Zimmer screen fixed above the main storage hoppers, which serves the double purpose of grading the coke into the various sizes and also carries it along the line of the hoppers. There are four storage hoppers, each approximately 19 ft. by 16 ft. by 21 ft. deep, formed of a steel-framed structure filled in with brindle brickwork set in cement.

Beneath the hoppers are two travelling de-breezing screens arranged to deliver into "Belle Isle" weighing and bagging machines, mounted on a bagging platform at tail-board height. Here the 1 cwt. bags of coke or "Dryco" are sealed and stocked ready for trucking on to lorries as required.

Ancillary Plant.

The gas from the vertical retort house is cooled by two batteries of vertical type air-cooled condensers, arranged for parallel or series working. The horizontal gas is cooled by three water-cooled condensers. These condensers are arranged for either parallel or series working. On the main between the condensers and exhausters is fixed a "Connersville" meter, measuring the crude vertical gas before it is mixed with the horizontal gas stream at the outlet of exhausters.

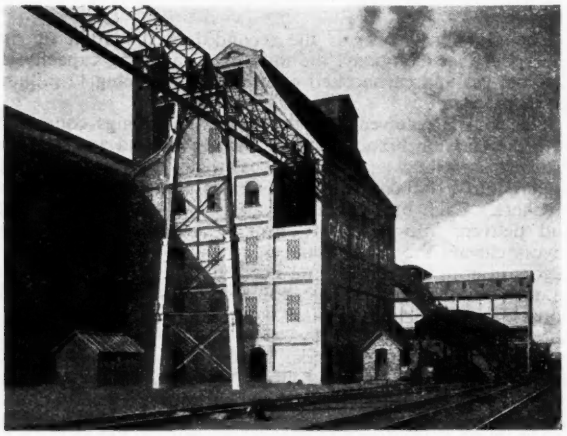
A test plant was erected to obtain a record of the working results in each retort house. A supply of gas is taken from each stream, purified, and supplied to "Sigma" calorific value recorders in the Test Room.

Adjacent to the condensers is the exhausters and power house. The exhausters are of the four-blade type, and are driven by horizontal steam engines. One set has also an electrical drive, the power being supplied by a 28 b.h.p. motor, and is for use in case of failure in the steam supply to the engines. Each set has a capacity of 125,000 cu.ft. per hour. The whole of the coal-handling plant, stoking, and coke machines, telpher transporter, carburetted water gas plant, water pumps, oxide conveyor in purifying house, &c., is electrically driven by direct current at 220 volts generated in the power house.

The gas, after leaving the exhausters, is passed through Livesey washers of which there are two—one being of 3 million, and the other 2½ million cu.ft. capacity *per diem*—and then through the detarrer to Whessoe & Kirkham rotary washer scrubbers. The strong liquor from the scrubbers passes by gravity into the washers. Between the Livesey washers and the rotary washers is fixed a Lodge-Cottrell electrical detarrer, rated at 6 million cu.ft. of gas *per diem* and having a 99% efficiency.

There are two sets of four purifiers, fixed above ground with revivifying floor beneath, and covered with steel roof supported by steel stanchions, the sides of the building being open. A Weck's centre valve controls the passage of the gas through the boxes. The direction of flow is downwards.

In order to minimize the nuisance caused by the smell of foul gas which escapes when a purifier is first opened for changing the oxide, each of the purifiers has a valve and connexion joined up to a 3-in. main leading to the inlet of the exhausters. The valve is opened after the purifier has been shut off, when the gas locked in the vessel will be at (say) 20 in. pressure. This pressure is reduced by the exhauster to nearly level gauge, when the valve is closed, and the purifier is then brought to atmospheric pressure by opening a blow-off cock leading to a vent pipe which is carried



The New Vertical Retort House at Garston.

well above the purifying house roof. The covers are then removed without any inconvenience to the men.

Near the purifying house are two Holmes rotary washers for the removal of benzole and naphthalene from the gas. The gas oil after washing is led to a benzolized oil storage tank beneath the recovery plant, described later.

Two meters are used for measuring coal gas; one is the usual type of wet station meter with a capacity of 125,000 cu.ft. per hour, while the second is a "Connersville" with a capacity of 325,000 cu.ft. per hour. The gas connexions of these meters are arranged for either parallel or series working.

Carburetted Water Gas Plant.

The first section of the carburetted water gas plant was erected in 1894, and until 1922 only carburetted water gas was manufactured at Garston.

Sections Nos. 1 and 2 which had a capacity of 1,500,000 cu.ft. *per diem* have been re-modelled by Messrs. Humphreys & Glasgow, Ltd., to their complete labourless safety automatic system incorporating the "back-run" process and waste-heat boilers, which increased the capacity of each section to 2,500,000 cu.ft. *per diem*. Sections Nos. 3 and 4 were dismantled in 1929, and on the site one large automatic set, complete with generator, carburettor, superheater, washer,

and waste-heat boiler, was erected having a capacity of 3 million cu.ft. in 24 hours.

Each set is completely automatic; generators are self-charging, self-clinkering, and self-steaming, and all the valves used during the cycle of blow and run are controlled by a mechanical operator. The waste-heat boilers of Nos. 1 and 2 sets are of the vertical type while that of No. 3 is horizontal.

The primary condensing plant is situated outside the generator house, the condensers being of the water tube type. The gas afterwards passes through cast-iron vertical pipe condensers before entering the relief holder. Any further cooling that may be required is carried out in two secondary vertical water tube condensers. Near these condensers is the relief holder, which is a single lift, steel column guided, and fitted with chain, pulley, and counterbalance weights at each column. The lift is 78 ft. in diameter and 25 ft. deep, and has a capacity of 120,000 cu.ft.

The gas is drawn by the exhausters from the relief holder through two filter boxes each 10 ft. square working in parallel. These boxes are filled with a 2 ft. 6 in. layer of coke (over ¼ in. mesh and through 1¼ in. mesh), and prove effective in removing much of the heavier tar. The bulk of the tar fog is removed by two Carter's "Hurricane" tar extractors fixed at the outlet of the exhausters. Between the "Hurricane" extractors and the purifiers is fixed a Lodge-Cottrell detarrer, having a capacity of 8¾ million cu.ft. per day, with an efficiency of not less than 99%. The purifying house contains eight purifiers arranged in two sets of four boxes each. On the inlet main to each set of boxes is a thermostatically controlled gas heater which maintains any desired inlet gas temperature.

On leaving the purifiers the gas is passed either through a rectangular station meter, 125,000 cu.ft. per hour capacity, and/or either a rotary meter or a "Connersville" meter, of 120,000 and 200,000 cu.ft. capacity respectively, working in parallel.

At the outlet of the meters the carburetted water gas is mixed with coal gas, which not only consists of that manufactured on the works but also that from the Wavertree Station, and the mixture then passes into the gasholders.

Oil Tanks and Pipe Lines.

Special mention should be made of the 6-in. oil pipe line laid in 1910 from the Stalbridge Dock through the streets to the storage tanks at the Works—a distance of about half a mile. The pipes are made of steel $\frac{1}{16}$ in. thicklap welded, and were tested to a pressure of 1,800 lb. per sq.in. They are covered with Hessian cloth, and coated with a tar preparation. By means of flexible connexions at the Dock Quay the pumps of the oil ships are connected to the pipe line and a large cargo (say 5,000 tons) can be discharged and placed into the Company's tanks in the course of a few days at practically no expense. The pipe line may also be used for filling tank barges which are sometimes used to convey oil down the river and canal to the Linacre Works. Facilities are also provided for loading road tank wagons, and this method is now in use for supplying the Linacre and other Works. The four oil tanks at Garston have a total capacity of 1,782,500 gallons, or 6,856 tons.

To control the quality of the mixed gases entering the holders, there is a test room near the station meter house, containing recording calorimeters showing the calorific values of each of the following streams: (*a*) The coal gas made at Garston, (*b*) the carburetted water gas made at Garston, (*c*) the coal gas received from the other Works, and (*d*) the mixed gases at inlet to holders. By frequent readings of the above and varying the amount of oil used in the water gas plant, a regular calorific value of 475 B.Th.U. is maintained.

For recording the quality of the gas delivered by the governors to the district mains the Gas Referees have specified a Fairweather recording calorimeter which is installed in a room in the governor house, where it is under the charge of the City Gas Examiner.

Gasholders.

There are two holders. No. 1, which is the largest of the Company's holders, is a 3-lift steel-column guided, and has a capacity of 4 million cu.ft. No. 2 is a 4-lift spiral guided holder of 2¼ million cu.ft. capacity.

After passing through the Venturi meter and before mixing with the gas made on the Works the receiver gas is passed through a multi-film brush washer for the extraction of benzole. The benzole recovery unit is by the Chemical Engineering and Wilton's Patent Furnace Company. The benzolized oil is stored in an underground tank of 1,500 gallons capacity, from which it is pumped through a meter in a multi-tubular exchange heater, where it is heated by the hot oil leaving the still. The oil then passes to a closed steam heater with a heating surface of 440 sq.ft. Here it is heated to a temperature of about 120° C. before passing over to the cast-iron still. The benzole product is first cooled by a primary cooler of the straight tube type, and then passes through a final condenser formed of an iron coil in an open-top water tank, with a cooling surface of 160 sq.ft., while the circulating oil is passed to a cooler of the usual type formed of 3 in. cast-iron pipe with a cooling surface of 2,200 sq.ft.

Distributing exhausters pump the mixed gas to the Caryl Street and Wavertree Stations. Three horizontal steam engines are used, each driving two exhausters. The three machines have a total capacity of 1,200,000 cu.ft. per hour against a back pressure of 45 in. with a speed of 90 r.p.m. One machine has additional connexions so that it may be used for received gas if required.

In order to reduce the oscillation at the inlet to governors caused by the distributing exhausters and also so as to increase the pressure at this point two turbo-driven boosters have been installed. The smaller machine has a capacity of 600,000 cu.ft. per hour, and the larger a capacity of 1,250,000 cu.ft. per hour, against a back pressure of 10 in. The larger machine is fitted with a Ledward & Beckett jet condenser and automatic governor to maintain an even pressure at the inlet to governors. An automatic by-pass is fitted across these machines, arranged to open if the pressure at the outlet drops below the holder pressure.

There are three station governors controlling the supply in Garston, Allerton, and Huyton. The Huyton district is supplied by one of Cowan's water-loaded governors and is operated by a Widlake automatic distant pressure control. The outlet mains are arranged so that each district may be taken over by another governor when necessary.

Chemical Laboratory.

Adjacent to the relief holder is the laboratory, where samples of coal, refractory materials, &c., are tested—also the usual work tests are carried out. The laboratory contains a complete 1/1,000 tons coal testing plant, furnaces and emery wheels for refractory material testing, coal sampling and grinding machines, and the necessary office accommodation. The works are complete with water wells, repair shops, portable machinery, recreation ground, and offices.

London and Southern Juniors

Proposed Sub-Divisions

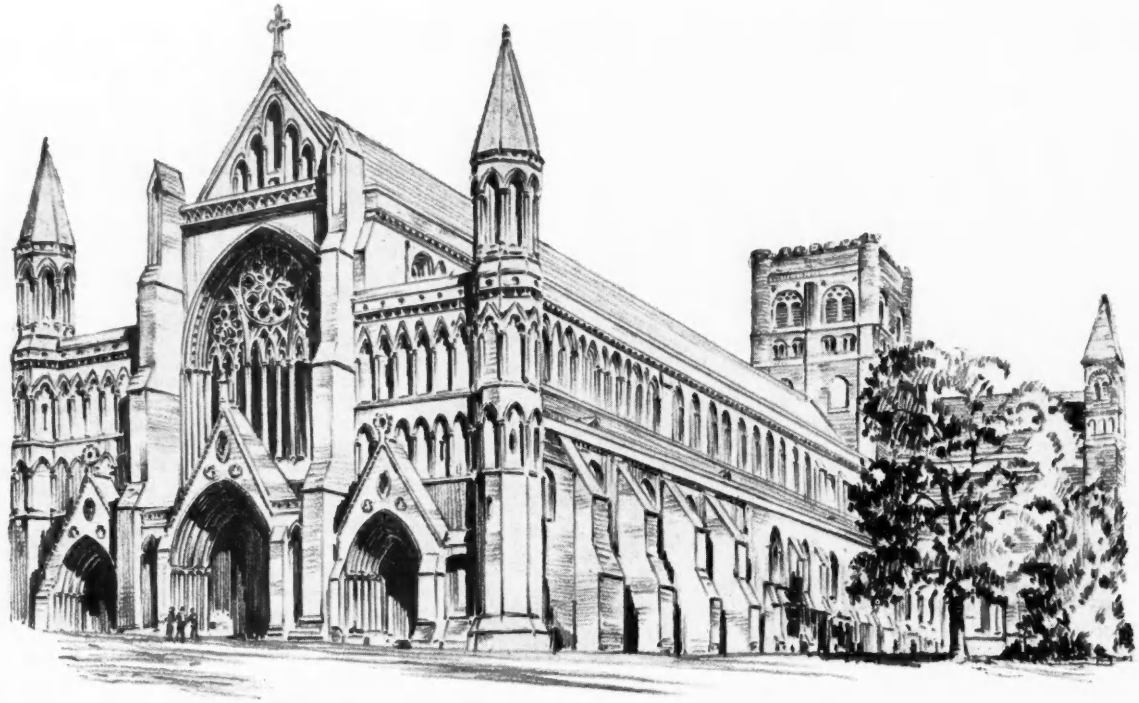
In view of the different interests of the large number of members—now more than 500—of the London and Southern District Junior Gas Association, the Council have under consideration a sub-division of the Association into three "subject" sections. These comprise: (*a*) Manufacture; (*b*) Distribution; and (*c*) Utilization.

The objects of this sectionalization are:

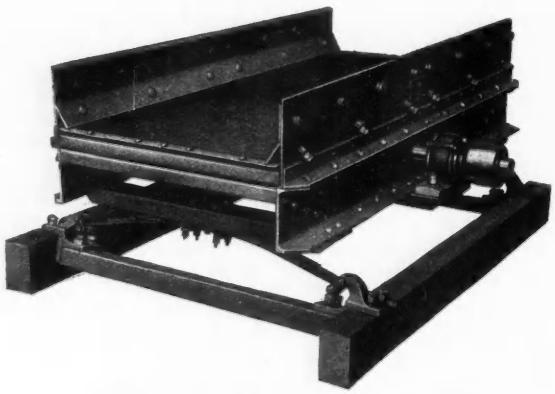
(1) To enable members, and particularly junior members, to discuss details of their work and experience in an informal manner.

(2) To hold the meetings in a way that will give time for a large number of members to speak and obtain experience in putting their ideas or suggestions before a technical gathering.

In order to further these objects the matters discussed will not be reported in the Press or the Joint Transactions in the ordinary way; but outstanding contributions may be submitted to the Council for publication. Before proceeding to elaborate the details of this scheme, however, the Council desire some indication of the measure of support that members are willing and able to give, and to this end members are being asked to indicate whether they approve of the scheme and in which of the three sections they desire to take part. All members would be eligible to attend any or all of the informal meetings without addition to their subscriptions, and it is stated that meetings would probably be held in the Westminster Technical Institute.



ST. ALBANS . . .



Pegson Open Deck Vibrating Screen

. . . Existing before the Roman conquest . . . sacked by Caesar's legions . . . the first Roman city Verulam being built on a neighbouring hill. Present city of St. Albans probably on the site of the British Settlement . . . built round the Abbey erected by Offa, King of Mercia, in honour of the Martyr, St. Alban.

The Watford and St. Albans Gas Company make annually about 1,900,000,000 cubic feet of gas, and supply gas to Aldenham, Abbots Langley, Boreham Wood, Bovingdon, Boxmoor, Bushey, Chorley Wood, Codicote, Datchworth, Digswell, Elstree, Essendon, Harpenden, Hatfield, Hemel Hempstead, King's Langley, Knebworth, Oxhey, Radlett, Redbourn, Rickmansworth, St. Albans, Sandridge, Shenley, Tewin, Watford, Watton-at-Stone, Welwyn, Welwyn Garden City, Wheathampstead.

Watford and St. Albans Gas Company at the St. Albans Works have recently installed a new Screening Plant which comprises a Single Deck Pegson Telsmith Scalping Screen and 4 Pegson Open-Deck Debreezing Screens.

PEGSON

COKE SCREENING AND HANDLING PLANT

PEGSON LTD., COALVILLE, LEICESTERSHIRE

PEGSON C.S.5

Gas Consolidation, Ltd.

The annual general meeting of Gas Consolidation, Ltd., was held on July 5, at Winchester House, Old Broad Street, London, E.C., Major JULIAN DAY (Chairman of the Company) presiding.

The CHAIRMAN said: During the year under review we have acquired additional investments to the value of £109,659. These are largely represented by controlling interests we have acquired in the Stone Gas Light and Coke Company, Ltd., and the Uttoxeter Gas Works, Ltd., and are welcome additions to our group in their respective areas. These two companies supply gas in adjoining areas in Staffordshire, between the area of the Kidsgrove Gaslight Company in the North, and the Rugeley, Cannock, and Lichfield areas in the South. We now control seven gas companies operating in the County of Stafford. We have also bought from the Newcastle-under-Lyme Rural District Council the gas undertaking at Audley, but this undertaking has been absorbed by the Kidsgrove Gaslight Company. In addition to the above acquisitions, we have also acquired, or agreed to acquire, all the outstanding shares of Palatine Gas Corporation, and that Corporation will shortly become a wholly-owned subsidiary of this Company. In due course it may be desirable that the controlling interest which it holds in the Ashton Gas Company should be transferred to Gas Consolidation, thus eliminating a subsidiary, the existence of which has become redundant. The other items on the assets side of the balance-sheet call, I think, for no special comment, as they are in the same form as shown last year.

On the liabilities' side of the balance-sheet we have increased our issued capital by the issue of 30,998 4½% cumulative preference shares, and 41,763 "A" ordinary shares. These shares have been issued to shareholders in exchange for shares which we have acquired during the year. Our loans and deposits stand at £67,629, against which you will see there are amounts owing from subsidiary companies of £40,715.

Turning now to the revenue account, dividends on investments have brought in £35,348 after deduction of tax (the gross figure being £47,509). Other income, less expenses, amounted to £5,969, of which £4,657 represented Directors' fees paid by subsidiary companies. On the debit side, provision for Directors' fees, payable by this Company, shows a small increase in accordance with the Articles of Association. Debenture interest also shows an increase, as we have in this year's accounts a full year's interest on this stock as against approximately seven months' interest last year. Interest on bank and other loans shows a slight decrease.

The balance carried to the appropriation account is £29,649, to which must be added the balance brought forward from last year, after payment of the final dividend, of £3,578, making a total available for distribution of £33,227. The preference dividend for the year required the net amount of £8,138, and the interim dividend on the "A" and "B" ordinary shares the net amount of £7,562, leaving a balance of £17,526, subject to the final dividend on the two classes of ordinary shares. Your Directors now recommend the payment of final dividends at the rate of 2½%, less tax, on the "A" ordinary shares, and at the rate of 4%, less tax, on the "B" ordinary shares, making, with the interim dividends already paid, dividends at the rate of 5% and 6% per annum, respectively. After payment of these dividends the amount to be carried forward will be £6,004, as compared with £3,578 last year.

During the year under review we have grown at a much slower rate than previously. Your Directors consider it to be most in the interests of shareholders that any acquisitions should be on really satisfactory terms, and they do not consider that size alone is a worthy object to pursue. This policy may, and probably will, entail relatively slow expansion, but we are satisfied that this will not in the long run be disadvantageous to shareholders. We are, to-day, in negotiation with several local authorities for the acquisition of their gas undertakings.

It is approximately four years since our incorporation, and we have now 12 operating subsidiary companies, including the Ashton Company. In addition, the Kegworth Gas Light and Coke Company, Ltd., which operates a small undertaking near the area of the Long Eaton Gas Company, is a wholly-owned subsidiary of that Company.

Last year these subsidiary companies supplied over 1,300 million cu.ft. of gas to more than 75,000 consumers through mains exceeding 500 miles in length. These figures, of course, exclude the substantial group of undertakings controlled by our Associated Company, Severn Valley Gas Corporation, in which we have a holding of £99,000 in deferred shares, a most satisfactory investment on which the rate of dividend for the year ended March 31 last was 6%.

Many benefits have accrued from our association with Severn Valley Gas Corporation. The two holding companies co-operate fully in the provision of a service organization for the benefit of the operating companies. It has been possible to share expenses and to make joint use of research and specialized services, to the advantage of all concerned.

Reverting to the Companies which we directly control, steady progress has been made during the year in the technical development of all the gas companies in our group.

Great care has been taken to maintain the quality of the gas at all times, and with this object in view our technical staff and travelling chemists have been taking special steps in order that complete satisfaction may be given to consumers. It is our policy to install at all works under our control recording calorimeters which show on a chart the heating value of the gas at all times, both day and night.

At the Cannock Works we are just completing a new carbonizing plant which we are satisfied will reduce the cost of making gas at this works. At Lichfield we are also modernizing the method of handling the coke which should result in good economy. At Tamworth we are now obtaining the advantage of the coke handling plant which was installed over a year ago, with the result that we can now supply customers with carefully graded sizes.

We are continuing our policy of extending our gas mains whenever economically practicable to outlying areas, and at Rugeley we are now engaged upon the laying of mains to Armitage, a distance of some two or three miles.

One of our largest subsidiary Companies—the Long Eaton Gas Company—continues to make good progress under the able management of Mr. George Stevenson. This works, due to excellent management over a long period of years, is producing gas at an exceptionally low figure. We have now experienced a full year's working of the arrangements by which the Mossley and Saddleworth Company use the surplus capacity of their highly efficient works to supply the greater part of the gas sold by the Ashton Company. This form of co-operation, under the energetic management of Mr. William Bennett, has resulted in considerable benefits to each party, and we may expect additional benefits when the co-ordination of the two companies has been completed. The area in which those two companies operate provides a good field for the sale of modern gas appliances, a matter which did not receive much attention in the past, and in which there is much leeway to make up. The progress being made in this direction should be reflected not only in increased sales of gas, but also in the greater satisfaction of consumers. The importance of this last point is only too often overlooked.

As I mentioned earlier, the Kidsgrove Gaslight Company has acquired the Audley Gas Undertaking of the Newcastle-under-Lyme Rural District Council, and has approximately doubled its authorized area, taking in certain new districts in addition to Audley. It is proposed to discontinue the manufacture of gas at the Audley Works and to supply gas in bulk from Kidsgrove. The necessary trunk main is already under construction, and it is expected that substantial economies will result as soon as the connexion has been made.

During the past year our subsidiary Companies have been selling new gas appliances at the rate of £84,335 per annum, which is highly satisfactory, taking into account that the total sales of gas of these Companies is 1,329 million cu.ft. This is an excellent result in relation to the quantity of gas sold. Where necessary, new showrooms have been established, and motor showrooms have proved very valuable in scattered districts. The introduction of these travelling showrooms was an experiment which met with immediate success. Originally, one was provided on hire for short periods, but some of our companies soon found it worth while to obtain others for whole-time service in their own districts.

Our companies have gradually introduced more progressive systems of charge by the adoption of block rates, and in some cases by voluntary two-part tariffs. The statutory harness in which gas companies are obliged to work has always discouraged the adoption of tariffs sufficiently attractive to develop more than the fringe of the industrial load, but in recent years the control of prices has become less rigid, and steady progress is now being made in meeting the potential demand. One interesting development is the disposition of the War Department to use gas in large quantities when available on attractive terms.

With regard to general prospects, we shall certainly not be without the stimulus of keen competition, but I believe that the future outlook is promising.

I now have pleasure in moving "That the report of the Directors and the accounts of the Company for the year ended May 31, 1938, be, and they are hereby, adopted."

Mr. S. G. WOOD seconded the resolution, and it was carried unanimously.

The proposed dividends were approved; the retiring Directors, Major Julian Day and Mr. S. G. Wood, were re-elected; the Auditors, Messrs. Brown, Fleming, and Murray, were re-appointed, and the proceedings terminated with a vote of thanks to the Chairman and Directors.

Gas Undertakings' Results

Bury.

The Bury Corporation Gas Undertaking last year made a gross profit for the year's working of £12,037, which, after meeting the usual capital charges, &c., of £10,518, leaves a net profit of £1,519. The amount of gas sold during the period shows a slight increase of 1,900,000 cu.ft. over the previous year.

Carlisle.

In his annual report to the Carlisle Corporation Gas Committee on the working of the undertaking for the year ended March 31 last, Mr. J. E. Blundell, the Engineer and Manager, says it will be within the knowledge of the Committee that he will reach the compulsory retiring age in February of next year, and consequently that this report will be the last that he will present to the Committee. He will have held the position of Engineer and Manager for twenty years, during which period the undertaking has almost doubled its output, and an entirely new works has been established. The capital expenditure during the period has amounted to £414,100, the debt repaid has amounted to £294,088, and the capital provided directly out of revenue to £40,019. "When the time comes to hand over the management of the undertaking to my successor," adds Mr. Blundell, "I can do so with a feeling of deep satisfaction that the Corporation possess an undertaking of which they can in every sense be proud." The quantity of gas sold in the twelve months to March last was over 655 million cu.ft., which compares with 629½ millions in the preceding twelve months. Of a total of 20,287 consumers, no fewer than 15,306 are supplied through slot meters. The number of cookers out on March 31 last was 18,024—an increase of 1,142 on the twelve months. The excess of income over expenditure, at just over a halfpenny per 1,000 cu.ft., represents £1,443.

Chorley.

The Chorley Gas Department made a gross profit of £12,198 in the year ended March 31, last, an increase of £1,287. The net profit was £3,479, an increase of £1,016 over the previous year. Councillor R. Smith, Chairman of the Gas Committee, stated that gas consumption has gone up by 30½ million cu.ft., one-half of which was due to the consumption in the absorbed Adlington gas area.

Galashiels.

The annual report of the Galashiels Gas Light Company, Ltd., states that in spite of the rise in price of coal, the price of gas will remain at the same figure as last year, 3s. 2d. for ordinary consumers, less 15% to engine power and trade consumers, and 3s. 7d. to consumers by prepayment meters. A dividend of 6%, free of tax, has been declared.

Manchester.

The income of the Manchester Corporation Gas Department for the twelve months ended March 31 last amounted to £1,256,320, as compared with £1,250,738 for the preceding year, but the increase is accounted for by the higher returns from coke. The quantity of gas sold was 6,282,718,000 cu.ft.—a trifling decrease of 0·33% on the year before, notwithstanding a considerable influx of new business. A somewhat reduced price yield—mainly due to the increased sales for industrial purposes under special contracts, and the further operation of the two-part tariff—has also affected the income. During the past year, 11,624 consumers have been on the optional two-part tariff, the consumption affected representing 26·53% of the total sales for the year; the concession involved being approximately £56,000. The quantity of gas consumed for industrial and commercial purposes was 31·79% of the total sales. Some 460,000,000 cu.ft. per annum of new business has been secured since January last. The Gas Committee report a marked increase in the sale of high-grade gas appliances, while much success has resulted from the re-planning and modernization of cooking equipment in large establishments and institutions. The financial position is strong, with a balance of £103,161 carried to next year's account.

Middlesbrough.

The annual report of the Middlesbrough Corporation Gas Engineer (Mr. J. W. Pallister) shows a net surplus of £22,362, the highest figure for 12 years. The profit for the previous year was £19,569. Mr. Pallister states that the result can be considered very gratifying, particularly since during the year costs of materials increased by 15% and wages by 6%. The report adds that the year had been remarkable for the record number of appliances sold. Income in this respect was 25% higher than the preceding year.

Nottingham.

In their report for the year ended March last, the Nottingham Corporation Gas Committee state that there has been a steady increase in gas sales amounting to 90,168,700 cu.ft., in spite of an unusually mild winter. The total gas sold was 2,806,060,100 cu.ft., or 13,328,785 therms. The Committee have this to say on the subject of coal prices: "The operation of the Coal Selling Scheme has resulted in an increase of from 4s. to 5s. per ton being asked for coal as compared with 1935 prices. Gas undertakings throughout the country have therefore been forced to consider alternative methods of gas production, and it is clear that less coal will be taken by the Gas Industry in the future. The outcome of the Selling Scheme may therefore well lead to a reduction of work for the miners whom the Scheme was largely designed to help. A full year at prices now being asked will increase our coal bill by £35,000 over the 1935 figures." Gas-fired coke grates are gaining favour because of the abolition of smoke nuisance. The Department have now fixed 277 of these. The use of gas for trade and industrial purposes has increased by a further 12% during the year. About 22% of the gas was coke oven gas purchased. The average consumption per meter (exclusive of lamp meters) equalled 20,058 cu.ft., as compared with 19,979 cu.ft. in the previous year. In the Net Revenue Appropriation Account a sum of £31,500 appears as contribution in relief of general rate.

Oldham.

Oldham Corporation Gas Department report a net profit of £16,507 on last year's working. This is £5,500 less than last year, which is accounted for by a reduction in the price of gas representing a concession to the consumer of £6,000.

Rotherham.

An increase in gas sales reaching the highly satisfactory figure of 14·1% is recorded by the County Borough of Rotherham Gas Department for the twelve months to March 31 last. The industrial gas load now represents 70% of the total gas sales. The total gas sold during the year was 1,722,805,000 cu.ft., as compared with 1,509,870,000 cu.ft. in the preceding twelve months. Domestic ordinary consumers took about 75 million cu.ft., and domestic prepayment consumers 255 millions. The two-part tariff system continues to expand, and on this basis 1,690 consumers last year took 92,269,000 cu.ft. (pre-tariff consumption, 41,481,000 cu.ft.). The total number of consumers increased by 918 during the year to 28,173, of whom 23,785 are prepayment and 4,388 ordinary. The whole of the gas distributed was purchased. During the year the number of public lamps increased by 162, to 2,893. The average sale price of gas for all purposes was 1s. 4·16d. per 1,000 cu.ft. A net profit of £1,648 is allocated to capital expenditure defrayed from revenue.

Stafford.

The Gas Committee of the Stafford Town Council report that for the year ended March 31, 1938, the Department made a gross profit of £19,568, a decrease of £686, compared with the previous year. After deducting all charges, &c., the net profit was £6,819, compared with £7,198 in 1936-37. The balance carried forward on the appropriation account was £16,404, and on the renewals fund £6,342. The quantity of gas made during the year was 395,154,000 cu.ft., an increase of 9,348,000 cu.ft., or 2·42% on the previous year. Goods to the value of £10,127 were sold through the showroom, and the profit realized on the sale of fittings and heating apparatus was £1,173, an increase of £203. New mains were laid for a distance of 3,593 yd., and the total length of main now laid was 76 miles. New consumers for the year totalled 481. The Council have approved a recommendation from the Gas Committee to appoint a gas sales representative at a salary of £220, rising to £250.

Smethwick.

A notable addition of practically 15% to their gas sales during the twelve months ended March last is recorded by the County Borough of Smethwick Gas Department, this increase bringing the total quantity sold up to just over 1,055¼ million cu.ft. Though the additional consumption was shared by all classes of consumers, the gain was particularly marked among those using gas for industrial purposes, who consumed 45¾% of the total output. No doubt, Smethwick is, in respect to industrial utilization of gas, more favourably situated than some undertakings, but their outstanding achievement is the result of years of painstaking effort in the cultivation of this load. The Gas Committee record with pleasure that the use of gas by industrialists has increased by 278 million cu.ft., or 135%, during the past fifteen

years, and they acknowledge the assistance rendered to them by the City of Birmingham Gas Department in developing this important load. At the present time the Smethwick Gas Department are actively engaged in the development of the use of gas for water heating, which, it is pointed out, offers prolific scope for the expansion of the domestic load. Domestic gas appliances are being sold at a greater rate than ever before, and demonstrations and home service are keeping the housewives gas-minded. The results of the vigorous policy adopted at Smethwick call for certain extensions to, and modernizing of, the manufacturing plant, and work is in progress on the reconstruction of a further section of the vertical retort installation. The outstanding debt amounts to 41½% of the total capital assets shown in the Capital Account.

Southport.

At 869 million cu.ft., the gas consumption in the area of the County Borough of Southport Gas Department during the financial year to March, 1938, as compared with the preceding twelve months, shows an increase of 2·13%. The Committee have again had a profitable year in the sale of their concentrated ammonia liquor, but difficulty is now being experienced in its disposal. The development of the sale of gas for central heating purposes continues to grow, 24 installations having been put into operation during the year. Other additions to the industrial load have been a large cyanide heat treatment furnace, the conversion of two large bakers' ovens from coke to gas, a gas-heated bottle drying machine to deal with 2,000 bottles a day, and a steam boiler at a tailoring works. For the purposes of central heating on a large scale or steam raising, there is a fixed price within the borough of 4d. per therm, less 5%; outside the borough 5d. per therm. also less 5%. It is pointed out in the report that the block system of charge is now being appreciated to some extent by those people who can afford to consume their gas by quarterly meter. This is reflected in the diminishing decrease in the number of ordinary meters, though there is again a substantial increase in the number of slot meters fixed. The number of public lamps increased by about 60, to 4,246. During the year 19,104 mantles were replaced; this representing an average of 1·62 mantles per nozzle per annum, or an effective life of 225 days per mantle—the approximate average being 1,364 burning hours. From the net profit a sum of £3,170 has been transferred in aid of rates. The amount of debt outstanding—£196,167—is equivalent to 27% of the capital outlay.

Trade Notes

Mechanical Shovels.

Although completely mechanical coal handling, direct from rail truck or barge to the retort, is an increasing practice, there are, of course, cases where on economic grounds it would not be practicable. At some point the coal must be "handled." A most economic method in these cases is the use of mobile power shovels. For instance, the "Hi-Lift" shovel marketed by the Chaseside Engineering Company, Ltd., can transfer loads from point to point at as high a pace as 40 tons an hour, or still economically at 5 tons an hour, and the total cost per ton, including wage and depreciation, will be a matter of pence only.

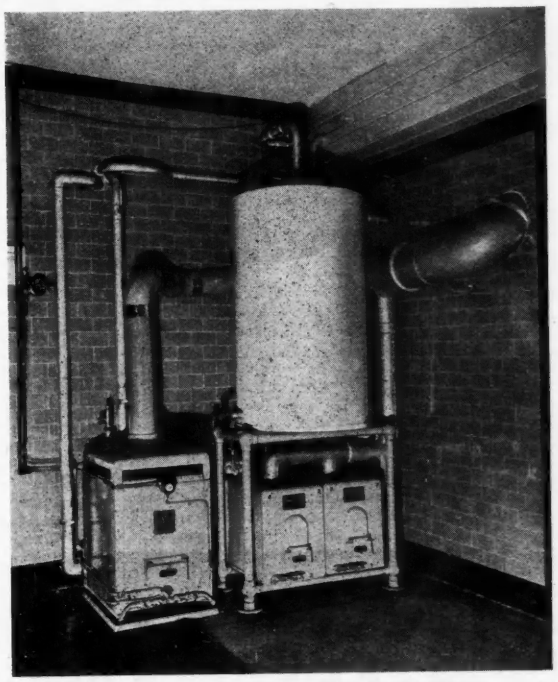
Coke handling is perhaps an even more important function for the mechanical shovel. The standard Chaseside machine can load from the distant heap straight into a 9-ft. high truck. This Company's new "Demon" model will actually load from the ground up to a clearance of 11 ft. 3 in. Only one man, the driver, is needed. Strongly made and simple to run, as many as twenty of these machines are in use by one single undertaking. Incidentally, their mobility is very useful to country undertakings with distant branch depôts, and an interesting feature is that a licence to run the machine on the public highways can be obtained for 5s. per annum. As a speed of 10 miles per hour can be attained, it will be readily appreciated that one shovel can be used over a number of works where conditions call for limited application.

The critical factor in all mechanical aids is whether they can be kept sufficiently continuously employed to justify the capital outlay. With these small mobile machines outlay is, of course, only modest, and there is no difficulty in keeping them employed because, unlike fixed conveyor systems, they can "handle" gas-cookers or barrels of tar, either from point to point or into lorries, with as much facility as loose coke.

A.R.P. Equipment.

In view of the ever-growing interest that is being taken in A.R.P., a recent publication by Siebe, Gorman, & Co., Ltd., is of more than ordinary significance. This deals with the firm's A.R.P. equipment, which includes respirators, protective clothing, stretchers, fire fighting equipment, gas proofing materials, first aid outfits, visual respirators for demonstration purposes, smelling sets of war gases for instructional purposes, and oxygen apparatus for the treatment of gas casualties.

GAS FIRED CENTRAL HEATING & HOT WATER SUPPLY FOR GAS SHOWROOMS



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A complete installation of Central Heating with "REX" Boiler and low pressure radiators has been installed for warming the new Seaford showrooms of the EASTBOURNE GAS COMPANY, with "EMPEROR" Thermal Storage set for the supply of hot water throughout the offices and demonstration rooms.

•

The illustration shows the No. 1 Series "REX" Gas-Fired Boiler for Central Heating and the twin "EMPEROR" Boilers and storage plant fitted in the heating chamber.

THOMAS POTTERTON (HEATING ENGINEERS) LTD.,

'Phone: Balham 1244-5-6

Cavendish Works, Balham, London, S.W. 12

'Grams: Potterton, Toot, London

SMITH S.H.C. METERS
arrest unaccounted-for-GAS!
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Markets and Manufactures

Current Sales of Gas Products

The London Market

July 11.

There is little change to report in the prices of Tar Products in the London market, to-day's values being as under:

Pitch nominal at about 33s. per ton f.o.b.
Creosote, 4¼d. to 5d.
Refined tar, 3¾d.
Pure toluole, 2s. 1d. to 2s. 2d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine, about 10s.
All per gallon naked at makers' works.

The Provinces

July 11.

Crude Gas-Works Tar, 15s. 3d. to 20s. 3d.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. 6d. to 32s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. 6d. to 32s. 6d.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4¼d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅜d. to 4⅝d.; low gravity, 4¼d. to 4¼d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid, 60's, 2s. to 2s. 1½d. Naphthalene, £13 10s. to £16. Salts, 80s. to 85s., bags included. Anthracene, "A" quality, 4¼d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis o f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, July 9.

The market is disappointing and, owing to lack of new business, prices are, if anything, a little easier.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch.—Little or no demand exists for this material and prices are nominal at about 25s. per ton f.o.b. for export and 23s. per ton *ex* works in bulk for home trade.

Refined tar continues in good call for home trade at 3¾d. to 4d. per gallon f.o.r. naked. Export, however, is a dull market at 3d. to 3⅛d. per gallon in buyers' packages at makers' works.

Creosote oil remains a steady market at the following prices: Specification oil, 5d. to 5¼d. per gallon; low gravity, 6¼d. to 6½d. per gallon; neutral oil, 5d. to 5¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—There is still no sign of a revival in buying and prices are a shade lower as follows: Pale, 97/99%, 1s. 7½d. to 1s. 9¼d. per gallon; dark, 97/99%, 1s. 6d. to 1s. 7½d. per gallon; and pale, 99/100%, 2s. to 2s. 3d. per gallon; all according to quality *ex* works in buyers' packages.

Crude naphtha is "marking time" at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 4d. to 1s. 4½d. per gallon and 90/190 heavy naphtha is 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is valued at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—90/160 grade is 10s. 6d. to 11s. per gallon and 90/140 grade is 11s. to 12s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9½	to	0	10	per gall. at works
Motor „ ..	1	3	„	1	3½	„ „ „
90% „ ..	1	4	„	1	4½	„ „
Pure ..	1	8	„	1	8½	„

Contracts Advertised To-Day

Coal.
Ilkley Gas Department. [p. 130.]
Newton Abbott Gas and Coke Company. [p. 130.]

Ferro-Concrete Piled Foundations.
Warrington Gas Department. [p. 130.]

Tubular Boiler.
Todmorden Gas Department. [p. 130.]

Gas Equipment for Clinics

There are now in this country about 1,500 ante-natal clinics, 3,000 child welfare centres, and 2,125 permanent school clinics. During the last year over 139,000 children received free meals under the schemes instituted by the local authorities.

These figures give some indication of the growth of the Public Health Services during the last few years. This widespread service involves the provision of buildings of various kinds and their careful planning and equipping. One of the most important items in the latter is naturally the fuel service to be installed, for on this depends in a large measure the smooth running and efficiency of the institution, whatever its nature.

A useful guide on the subject, illustrated by description and photographs of recently opened public health institutions of various kinds, has just been published by the British Commercial Gas Association. "The Public Health Services" is its title, and among the buildings described, all of which rely largely on gas for various essential purposes, are the fine Deptford Central Clinic, the City of Westminster Maternity and Child Welfare Centre (the new building of which was opened by H.M. the Queen last year), Powick Mental Hospital, Worcester, and the Liverpool Education Committee's Central Kitchen for the feeding of some 5,000 necessitous schoolchildren.

PROTECT WITH

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a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
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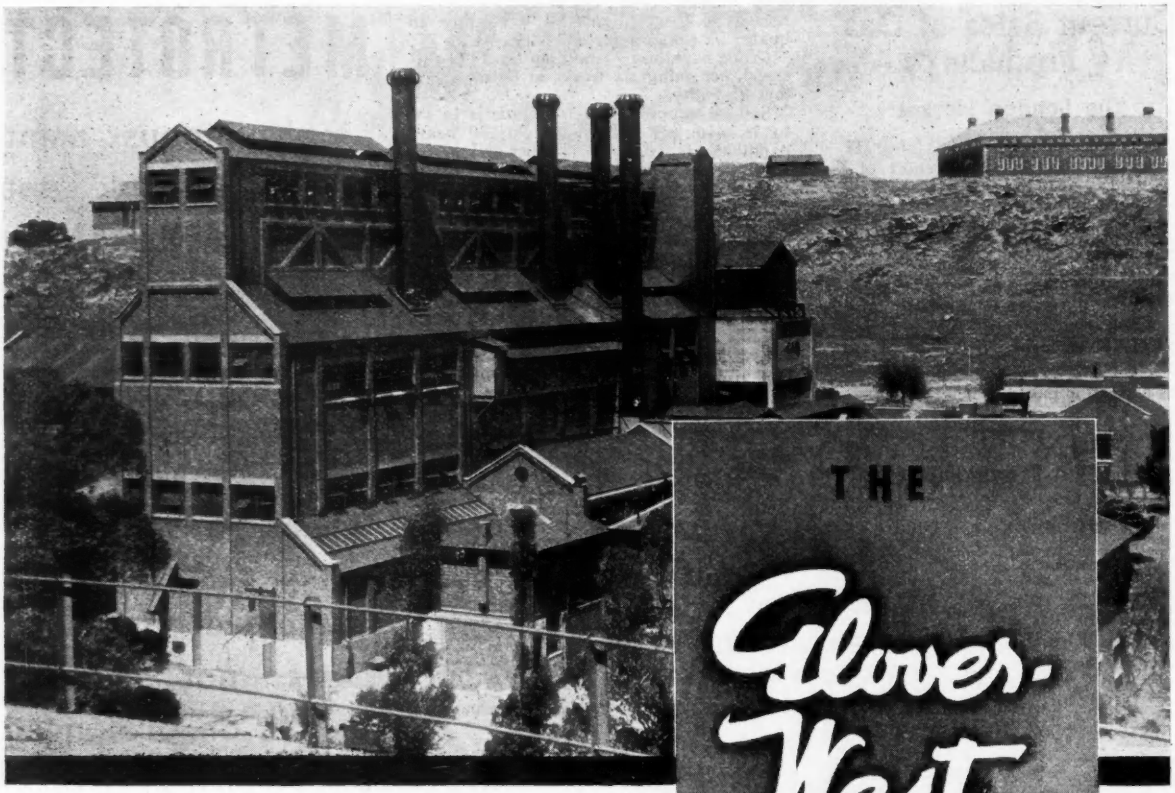
KING WILLIAM STREET,
E.C.4.

● CARBONIZATION IN VERTICAL RETORTS



The modern Glover-West vertical retort plant has behind it the accumulated experience of 64 years constant research and development for the advancement of gas production methods the world over.

● *423 plants have been built or are on order for 223 Gas Undertakings in 24 countries.*

The picture shows the three installations of Glover-West vertical retorts at Johannesburg City Council's Cottesloe gas works. The carbonising unit of the complete modern gasworks ordered for Johannesburg from this company in 1926 has been trebled to meet the rapid growth of demand. The latest extension put to work in 1937 is nearest the camera.

●

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C.2

GAS STOCKS AND SHARES

Conditions on the Stock Exchange continued active last week. A feature was the strength of gilt-edged stocks, which have advanced considerably during the past fortnight. Little change occurred in home rail "ordinaries," though a few of the debenture and guaranteed issues moved up slightly. Big business took place among industrials, tobacco and aircraft shares being prominent. Some hesitancy set in towards the close, due to profit-taking on Wall Street and the consequent fall in Americans, and prices were inclined to react, though in practically all sections quotations finished higher than a week ago.

The narrowing of yields on gilt-edged stocks gave an impetus to the demand for other high-class investment issues, and this was reflected in an increased volume of business in the Gas market. Prices responded accordingly, and it will be seen in the list below that a number of stocks increased in value. Gas Light units rose a further 6d. to 24s. 6d., and some of the Company's preference and debenture stocks also hardened. Imperial Continental made a sharp rise of 8 points to 127½, while a number of other stocks were moved up 1 to 2 points. The two recent issues by the Commercial Gas Company—viz., £140,000 4% redeemable preference stock and £200,000 3¼% redeemable debenture stock—are now officially quoted and have therefore been added to the List. At the Provincial Exchanges, the two 4% debenture stocks of the Bristol Company both closed 2½ points higher, and Newcastle 5% (1943) debenture hardened 1.

In the lists of gas preference and debenture stocks on offer this week the former includes only a few of the larger undertakings, though, as will be seen below, among the debenture stocks available appear a few small lots, not as a rule readily obtainable, which are attractive at current prices:

Preference Stocks.

Amount Offered.	——	Price.	Yield.
£			£ s. d.
20,000	Associated Gas and Water 4% Red. (three months' dividend November 30)	20/- free	4 0 0
3,700	Associated Gas and Water 4% Perp. ..	18/–	4 8 10
500	Gas Consolidation 4% Cum. Red.	19/9	4 1 0
10,000	Gas Light 3¾% Red.	102	3 13 0
100	Guildford 5%	111	4 10 1
10,000	Severn Valley 4½% Cum.	21/– free	4 5 8
5,000	United Kingdom Gas 4½% 1st Cum.	21/6	4 3 8
900	Wandsworth 4%	100	4 0 0

Debenture Stocks.

750	Bournemouth 3%	83	3 12 3
424	East Surrey 5%	120	4 3 0
2,500	Gas Consolidation 3½% Red.	97½	3 11 9
3,000	Gas Light 4½% Red.	112	4 0 4
100	Hampton Court 4%	100	4 0 0
210	Lea Bridge 4%	100	4 0 0
100	Luton 5%	115	4 7 0
10,000	South-Eastern Gas 3½% Red.	102 free	3 13 6
200	Stroud 3¼% Red.	98	3 12 0
250	Tottenham 4%	100	4 0 0

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 8.	Rise or Fall on Week.
1,767,439	Mar. 7	8	8	Alliance & Dublin Ord. ...	145—155	...
374,000	June 20	4	4	Do. 4 p.c. Deb. ...	93—108	...
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
444,389	,,	§–/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/–	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	17/—19/–	...
500,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
558,890	Feb. 21	7	7	Barnet Ord. 7 p.c.	158—163	...
300,000	Apl. 4	1/4½	1/9†	Bombay, Ltd.	24/6—26/6	...
179,915	Feb. 21	9½	9½	Bournemouth sliding scale ...	195—205	...
590,407	,,	7	7	Do. 7 p.c. max. ...	157—162	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	77—82	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Feb. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	145—150	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	128—133	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	127—132	+2
855,000	Mar. 7	7	8	British Ord.	138—143	...
100,000	June 3	7	7	Do. 7 p.c. Pref	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
100,000	22 May '33	6	4	Cape Town, Ltd.	1½—2½	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	Feb. 7	6	6	Cardiff Con. Ord.	120—125	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Mar. 21	2/–	2/–	Colombo Ord....	1⅞—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	23/—25/–	...
739,453	Mar. 21	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/–	...
1,775,005	Feb. 7	5	5	Commercial Ord.	81—86	...
140,000	—	—	—	Do. 4 p.c. Red. Pref.	99—102	...
620,001	June 3	3	3	Do. 3 p.c. Deb. ...	72—77	...
286,344	Feb. 7	5	5	Do. 5 p.c. Deb. ...	114—119	...
200,000	—	—	—	Do. 3½ p.c. Red. Deb.	99—102	...
807,560	Feb. 21	7	7	Croydon sliding scale ...	137—142	...
644,590	,,	5	5	Do. max. div. ...	107—112	...
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	113—118	...
239,000	Feb. 7	5	5	East Hull Ord. 5 p.c.	96—101	...
185,355	Feb. 21	6	6	East Surrey Ord. 5 p.c. ...	118—123	...
176,211	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
250,000	July 4	4	8	Gas Consolidation Ord. 'B' ...	20/—21/–*	+–/6
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
19,223,324	Feb. 7	5½	5½	Gas Light & Coke Ord. ...	24/—25/–a	+–/6
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	79—82	+2
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	100—103	...
2,993,000	July 4	—	3½	Do. 3½ p.c. Red. Pref. ...	100—103*	...
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb. ...	81—84	+2
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—114	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	109—112	...
700,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	97½—100½	+½
270,466	Feb. 21	6	6	Harrogate New Cons. ...	118—123	...
157,500	Mar. 21	1/2½	1/–‡	Hong Kong and China Ord. ...	½—1	...
213,200	Feb. 7	6	6	Hornsey Con. 3½ p.c. ...	100—110	...
5,600,000	May 9	8	12	Imperial Continental Cap ...	125—130	+8
223,130	Jan. 17	3½	3½	Do. 3½ p.c. Red. Deb. ...	88—93	...
285,242	Feb. 21	8½	8½	Lea Bridge 5 p.c. Ord. ...	167—172	...
11,751	Feb. 21	8	10	Maidstone 5 p.c. Cap. ...	175—185	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
75,000	May 23	†10	†10	Malta & Mediterranean ...	137—142	...
				Metropolitan (of Melbourne)		
392,000	Apl. 1	5½	5½	5½ p.c. Red. Deb.	99—102	...
231,977	Feb. 21	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	Feb. 21	4	4	M.S. Utility 4 p.c. Cons. Pref.	95—100	...
360,075	June 20	4	4	Do. 4 p.c. Deb. ...	95—100	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	May 9	†6	†6	Montevideo, Ltd.	72—77	+2
250,000	Mar. 7	7½	7½	North Middlesex 6 p.c. Con.	145—150	...
396,160	Feb. 7	5	5	Northampton 5 p.c. max. ...	107—112	...
300,000	Apl. 25	†9	†7	Oriental, Ltd.	147—152	–2
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	150—155	–3
621,667	Feb. 7	8½	8½	Portsmouth & Gosport Cons.	160—165	...
241,446	,,	5	5	Do. 5 p.c. max. ...	102—107	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
75,000	,,	—	4	Do. 4 p.c. Pref. ...	95—100	...
114,000	Feb. 7	5	5	Preston 5 p.c. Pref.	106—109	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	+1
625,959	Jan. 17	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
15,000	Mar. 21	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9½	...
441,275	Apl. 25	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/—23/–	+–/6
460,810	Mar. 21	–/10⅝	–/10⅝	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Feb. 7	8½	5	Shrewsbury 5 p.c. Ord. ...	128—133	...
9,000	June 3	4	†4	South African Ord.	4½—5½	+½
1,371,752	Apl. 25	1/2⅞	1/2⅞	South East'n Gas Cn. Ld. Ord.	22/—24/–	...
871,636	Mar. 7	–/10⅝	–/10⅝	Do. 4½ p.c. Red. Cum. Pref.	20/6—22/6	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/–	...
450,000	Feb. 7	4	4	Do. 4 p.c. Deb.	100—103	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98	...
6,709,895	Feb. 7	6	5	South Met. Ord.	106—109	+1
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	130—135	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	97—100	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	77½—80½	...
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	108—111*	–1
600,000	,,	—	§31/–	Do. 3½ p.c. Red. Deb. ...	99—102*	...
1,543,795	Feb. 7	6	6	South Suburban Ord. 5 p.c. ...	118—123	...
512,825	,,	5	5	Do. 5 p.c. Pref.... ...	110—115	...
500,000	,,	4	4	Do. 4 p.c. Pref.... ...	95—100	...
250,000	,,	§18/9	3½	Do. 3½ p.c. Red. Pref. ...	98—101	...
888,587	June 3	5	5	Do. 5 p.c. Deb.	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb.	96—101	...
200,000	Mar. 1	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
427,859	Apl. 25	1/2½	9⅜	S. Western Gas & Water Ord.	16/6—18/6	...
160,523	,,	–/10⅜	–/10⅜	Do. 4½ p.c. Red. Cum. Pf.	19/—21/–	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Feb. 7	5	5½	Southampton Ord. 5 p.c. ...	108—113	...
148,836	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
350,000	Feb. 7	5½	5½	Swansea 5½ p.c. Red. Pref. ...	108—113	...
94,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Feb. 7	6⅜	6⅜	Tottenham and District Ord.	127—132	+1
409,835	,,	5½	5½	Do. 5½ p.c. Pref. ...	119—124	...
62,235	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
371,850	June 3	4	4	Do. 4 p.c. Deb. ...	95–100	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
888,629	Apl. 4	4	6	U. Kingdom Gas Cor. Ord. ...	18/6—20/6	...
937,743	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/6—21/6	...
500,000	,,	–/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/–	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/–	...
1,000,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Feb. 7	7	7	Uxbridge, &c., 5 p.c.	133—138	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Feb. 7	7	7	Wandsworth Consolidated ...	137—142	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	98—101	...
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
558,342	Feb. 7	7	7	Watford and St. Albans Ord.	137—142	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	120—125	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations July 8.	Rise or Fall on Week.
202,152	Mar. 21	5	5	Ascot Ord.	103—108	...
128,182	Dec. 13	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Mar. 21	...	–/4⅛	Associated Utilities 4 p.c. Pref.	16/—18/–	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 21	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	150—160	—5
37,440	Feb. 7	10	10	Cam. Univ. & Town 10 p.c. max.	190—200	...
125,970	,,	7	7	Do. 7 p.c. max.	135—140	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	Feb. 7	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Feb. 21	4	4	Croydon 4 p.c. Pref.	98—101	...
130,000	June 20	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Mar. 7	7½	8½	Eastbourne 'A' 5 p.c. ...	140—150	—12½
198,000	,,	6	7	Do. 'B' 3½ p.c.	115—125	—7½
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
24,000	Feb. 21	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Feb. 21	8	9	Guildford Cons.	167—172	...
54,055	,,	5	5	Do. 5 p.c. Pref.	108—113	...
68,250	June 20	5	5	Do. 5 p.c. Deb	107—112	...
156,600	Feb. 21	7½	7½	Hampton Court Cons. ...	140—150	...
80,000	Feb. 21	4	4	Lea Bridge 4 p.c. Pref. ...	94—99	...
60,000	,,	6	6	Do. 6 p.c. Pref.	123—128	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Mar. 7	8½	8½	Luton Cons. 'A'	160—165	...
107,960	Mar. 21	4	5½	Mid Kent Ord.	8½—9½	...
230,940	Feb. 7	10	10	Oxford & District Ord. ...	198—203	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	May 9	7½	7½	Peterborough Ord.	135—145	...
64,990	Mar. 7	6½	7½	Redditch Ord....	120—130	...
166,850	Feb. 7	8	8	Romford Ord....	144—149	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Mar. 21	5	5	Do. 5 p.c. Deb.	111—116	...
25,570	Feb. 7	5½	5½	Rugby 5½ p.c. Pref.	123—128	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	105—110	...
42,750	June 3	5½	5½	Do. 5½ p.c. Deb.	118—123	...
110,950	Feb. 21	8	8	Ryde Ord.	140—150	...
270,086	Mar. 21	7	7	Slough Ord.	128—133	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/–	...
28,866	Mar. 7	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
137,730	Feb. 21	7	7	Southgate & Dist. 7 p.c. max.	140—145	...
62,500	,,	5	5	Do. 5 p.c. Pref.	110—115	...
117,228	Feb. 7	5	7	Swindon Cons.	104—109	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c. Pref.	107—112	...
33,858	May 9	–/2·70b	4½	United Kingdom Gas Corpn. 4½ p.c. 1st Cum. Pref. ...	18/—20/–	...
130,000	Feb. 7	5	8	Wakefield Ord.	118—123	...
81,650	,,	5	5	Do. 5 p.c. max.	101—106	...
82,000	Feb. 21	6	6	Weymouth Ord.	105—110	...
98,384	Feb. 7	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	June 20	5½	5½	Do. 5½ p.c. Rd. Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	Feb. 21	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	120—125	...
120,000	,,	5	5	Do. 5 p.c. Pref.	106—111	...
35,000	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 8.	Rise or Fall on Week.
347,756	Feb. 7	5	6	Bath Cons.	120—122	...
1,667,250	Feb. 7	5	5	Bristol, 5 p.c. max.	113—115	...
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	101—103	+2½
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	+2½
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Feb. 21	5	5	Newport (Mon). 5 p.c. max....	99—101	...
13,200	Mar. 21	7	8⅝	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	5	6	Do. 7 p.c. 'B'	12—12½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	12—12½	...
140,778	Feb. 7	5	5	Weston-super-Mare Cons. ...	110—112	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	93—95	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 8.	Rise or Fall on Week.
157,150	Feb. 7	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 21	6	6	Liverpool 5 p.c. Ord.... ...	124⅝—125½	...
245,500	June 20	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	Jan. 17	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,280	Feb. 7	10	10	Preston 'A' 10 p.c.	202—212	...
188,219	,,	7	7	Do. 'B' 7 p.c.	144—154	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 8.	Rise or Fall on Week.
122,577	Feb. 21	8	8	Blyth 5 p.c. Ord.	163½—164½	...
732,000	Feb. 21	5	5	Hartlepool G. & W. Cn. & New	110—112	...
2,061,315	Feb. 7	5	5⅝	Newcastle & Gateshead Con.	22/9—23/3a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99½—100½	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88½—89½	...
277,285	May 9	5	5	Do. 5 p.c. Deb. '43 ...	104—106	+1
332,351	Feb. 7	6	6	Sunderland 6 p.c. max. ...	137—139	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 8.	Rise or Fall on Week.
542,270	Feb. 21	6	9	Derby Con.	135—140	...
55,000	June 3	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 8.	Rise or Fall on Week.
10,000	Feb. 21	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Feb. 21	6½	6½	Sheffield Cons.	140—143	...
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103*	—1

a The quotation is per £1 of Stock. *b* Actual. * Ex div.

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